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OCTOBER
1957

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NINETY-EIGHTH ANNUAL SESSION

VOLUME 55
NUMBER 4

MIAMI • NOVEMBER 4-7

Experience with New Posterior Teeth Confirms Research Findings

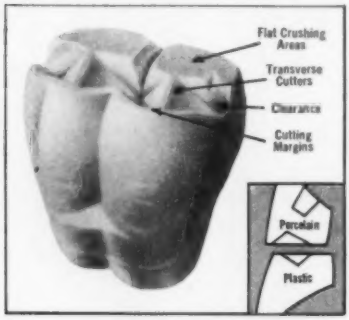
MYERSON AND SEARS DESIGN AND COMBINATION OF MATERIALS PROVE BENEFICIAL IN FULL RANGE OF CASES

Review

February 1956, Richard L. Myerson reported to the American Academy for Plastic Research in Dentistry his finding of dramatic reduction in wear of plastic teeth when opposed to properly designed porcelain teeth. November 1956, Victor H. Sears and Simon Myerson reported remarkable success in forty-eight clinical test cases. At the time of this writing, thousands of full dentures have been made with Myerson and Sears porcelain-plastic posterior teeth by the profession-at-large. There can be no doubt that this use has been extensive enough to be highly conclusive.

Results

Success has been reported on the most difficult as well as on normal cases. Equally important, no single case of failure or disappointment has been reported either voluntarily or upon solicitation.



Details of occlusal construction of new Myerson and Sears posterior teeth. Insert drawing shows how upper and lower teeth meet in one plane.

Conclusion

Many benefits can be derived from the use of Myerson and Sears posterior teeth. They are listed below.

I Benefits of Opposing Porcelain Teeth to Plastic

1. One tenth the loss due to wear compared to that experienced when opposing plastic teeth to plastic.
2. Less shock and resultant trauma and "clicking" than porcelain-to-porcelain.
3. Easier adaptation and adjustment due to lower teeth being plastic.
4. Increased masticating efficiency due to maintenance of sharpness by the upper teeth which are porcelain.

II Benefits of the Myerson and Sears Occlusal Design

1. Fulfilling the requirements essential to success in opposing porcelain to plastic.
2. Increased stability by directing the vertical force of mastication mainly to the lingual side.
3. Increased stability by directing most of the vertical force of mastication to the second bicuspid — first molar region.
4. Increased stability by absence of interdigitating cusps.
5. Easy set-up and articulation.

Whenever the above benefits are desired, the use of these new posterior teeth is indicated.

Available literature includes a booklet describing the new development, a technique by Dr. Victor H. Sears, and mould charts. Inquiries are welcomed. Address: MYERSON TOOTH CORPORATION, 90 Hamilton Street, Cambridge 39, Mass.

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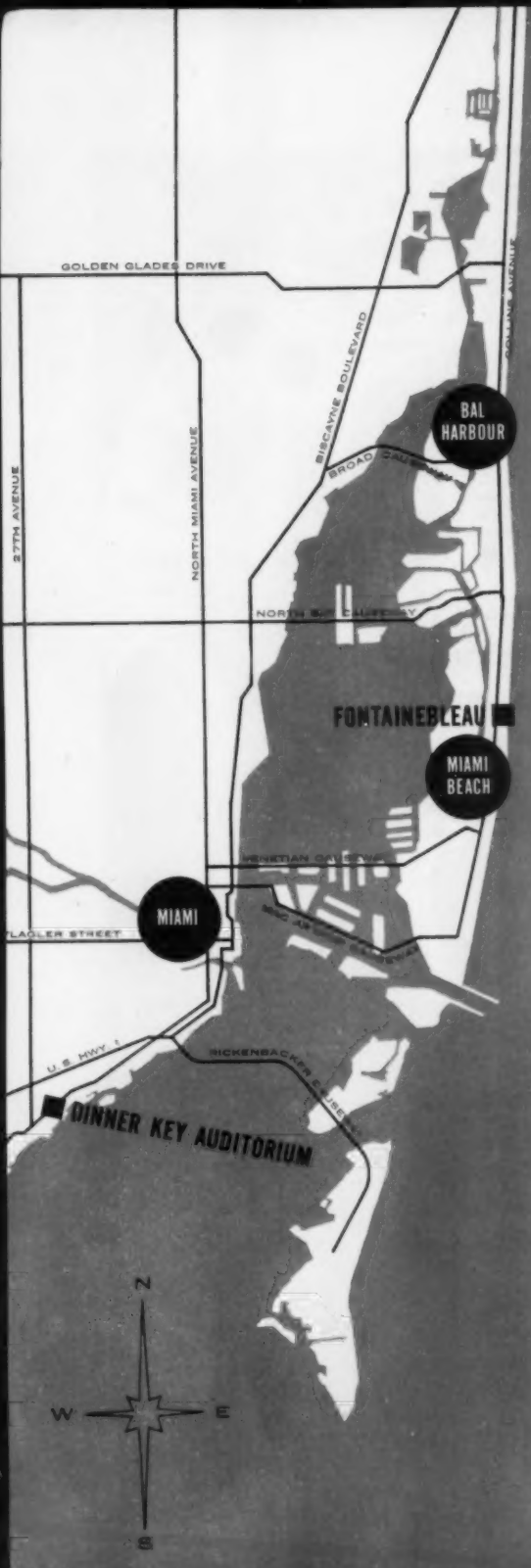

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98TH ANNUAL SESSION

AMERICAN DENTAL

ASSOCIATION

NOVEMBER 4-7, 1957

MIAMI—MIAMI BEACH

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Reservations may be made for accommodations in hotels in three different sections of the Greater Miami Area; Miami, Miami Beach and Bal Harbour. The hotels in each section are listed in order of location reading from north to south, *e. g.*, top to bottom. The approximate time required to travel between the hotels and the Dinner Key Auditorium in Miami is indicated for each section. The scientific session and exhibits will be held in the Dinner Key Auditorium in Miami. The House of Delegates will meet in the Fontainebleau Hotel in Miami Beach.

All reservations for accommodations in any of the hotels listed may be made by completing this application and mailing it to the A.D.A. Housing Bureau, Box 1511, Miami Beach, Florida. Be sure to indicate your arrival and departure time. Reservations will be held until 6 p.m. of the day of arrival unless special arrangements are made with the hotel.

Names of all persons who intend to occupy the accommodations must be listed. List four choices of hotels. Confirmation will be sent to the applicant by the hotel which has accepted the reservation. Please write the A.D.A. Housing Bureau in Miami Beach if you wish to cancel the reservation.

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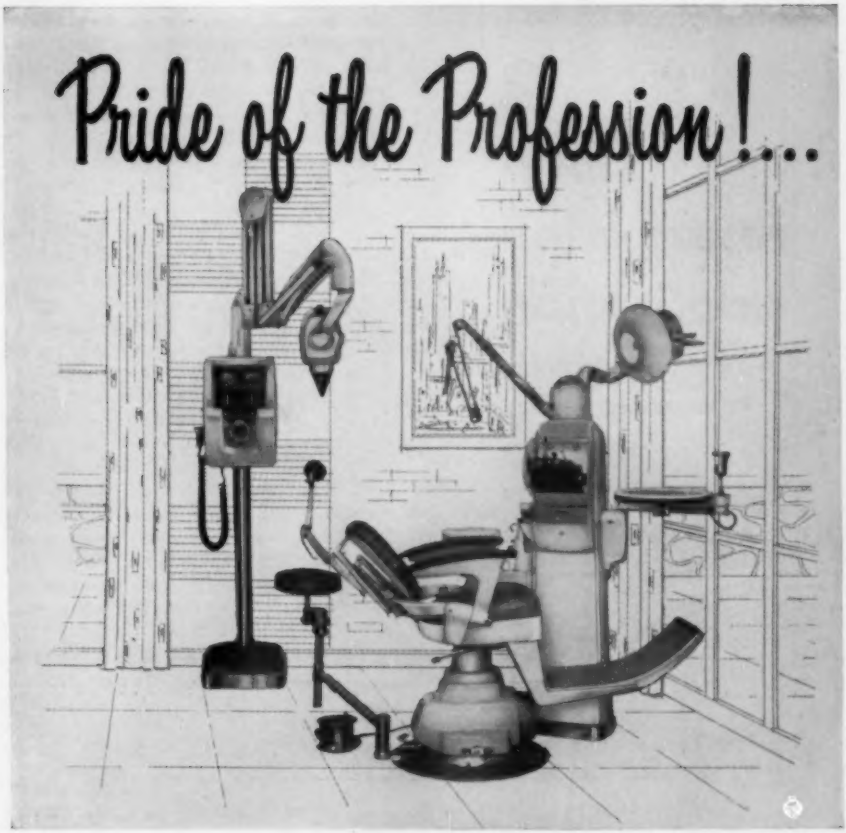

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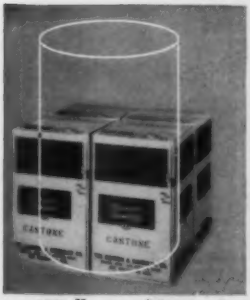

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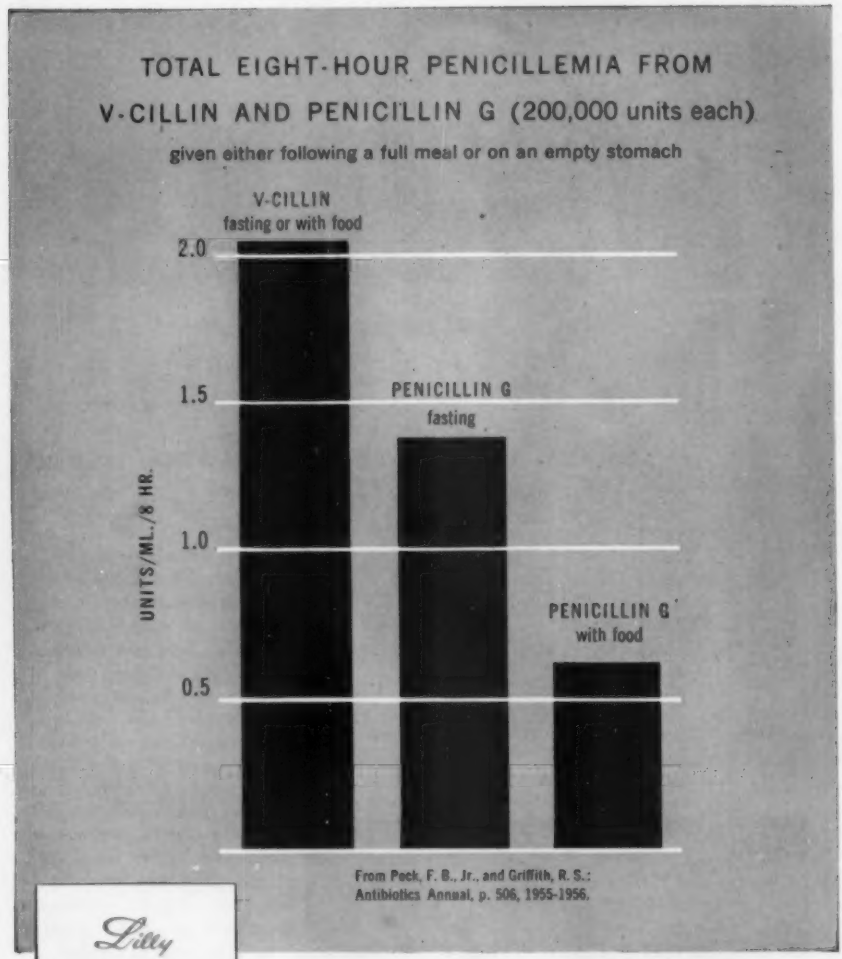

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For example, what happens when a bowl of bright apples is put in reach of the small fry? Or when the refrigerator may be freely raided for apples? Lips smack, teeth sink into crisp juiciness, healthfully satisfying the between-meals urge to eat, topping off the school lunch, or evening meal.

When a young family makes a point of keeping fresh fruits plentifully available, the entire dietary pattern, and the eating habits developed by the children, are favorably affected.

The important thing is that they do make a point of it.

Worth suggesting?

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A-14

The Why of Oatmeal

Take a moment to consider *why* oatmeal is recommended in virtually all therapeutic diets... *why* it is so widely used as a first solid food for infants...*why* it is suggested so frequently in geriatric diets...and *why* it is the favorite breakfast dish of millions.

Patients whose digestive tracts must be pampered with bland, restricted-fiber, semisolid or other limited menus, must obtain their daily nutrition from easily digested, easily assimilated foods offering high nutrient value.

Oatmeal-and-milk (whole or skim) is a food of choice in all such diets—for several reasons—and not only for breakfast: its soft particulate texture ...its appealing taste...its almost complete digestibility...its rich supply of protein...and its B vitamins and minerals. Even such individualized diets as low purine, low fat, low salt, and many others give broad recognition to oatmeal because it provides high nutritional value without interfering with most dietary restrictions.

These are the reasons, too, why oatmeal is widely recommended as the first solid food for the three-month-old infant's delicate digestive tract...and for the oldster whose changing dietary habits often make adequate protein nutrition difficult.

And for the millions of energetic men, women, and children who need and appreciate a good, sturdy breakfast every day, oatmeal—for the same reasons—presents a very real nutritional plus.

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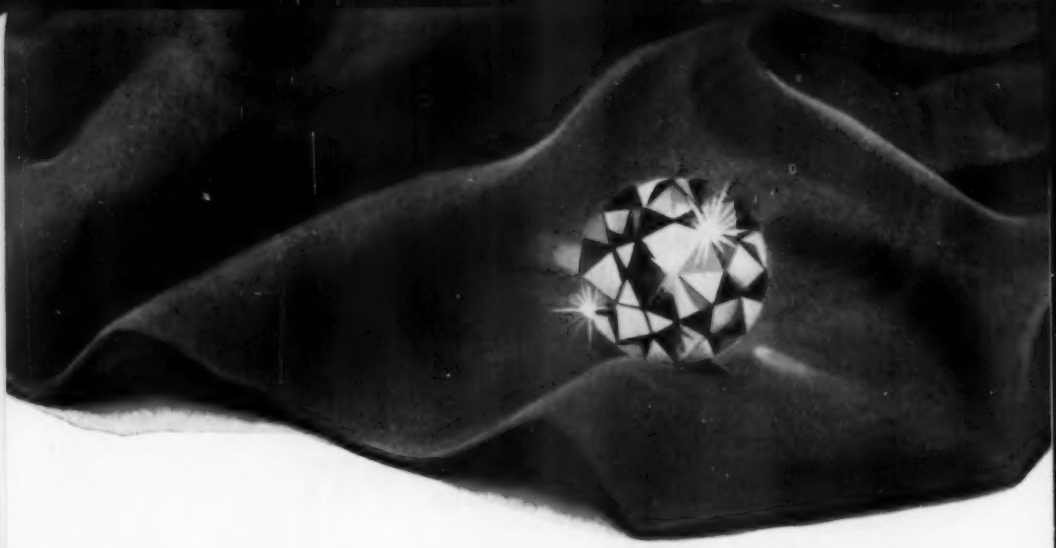

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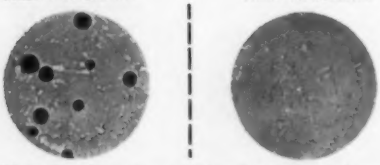

Note in these two photomicrographs how the denser, more homogeneous structure of vacuum fired porcelain is substantially free from the voids and bubbles found in conventional porcelain.

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THE DENTISTS' SUPPLY COMPANY OF N.Y.

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OCTOBER 1957 THE Journal OF THE AMERICAN DENTAL ASSOCIATION VOLUME 55 • NUMBER 4

Management of multiple jacket restorations

John Haase, D.D.S., Los Angeles

Constructing several porcelain or plastic jackets for the same patient involves problems not encountered when only one jacket is prepared, problems which demand intelligent understanding if maximum comfort is to be assured the patient.

First, there is the psychological problem. Because many jackets are constructed for the sole or primary purpose of enhancing the esthetic appearance of the patient, the dentist must recognize the concern of the patient with the esthetic success of the treatment.

The patient will have many questions regarding the success of the undertaking, the pain involved, and the permanency of the restoration. The dentist must answer all these questions clearly and directly in nontechnical but accurate terms. At the same time, he must always maintain the feeling and tone of personal concern for the patient and his fears.

More importantly, there is the physiological problem. Because construction of several jackets involves, of necessity, a certain amount of trauma to the hard tissues and to the soft investing tissues, the dentist must, before starting, note the health of the gingival tissues. If these are healthy initially, every care must be taken to maintain their health during treatment. If a pathologic condition is present, it should be corrected before extensive jacket work is attempted.

A woman, aged 40, came for treatment because she had always been conscious of the unsightly appearance of her anterior teeth. The procedure, which will be outlined, was used to reduce the psychological and physiological hazards while the work was in progress.

PROCEDURE

First Visit • At the first visit, the efficacy of jackets is described to the patient. The procedures involved are explained fully, and color slides are projected to illustrate before and after views. The fact that the process will be lengthy but relatively painless is explained, and the patient is shown that temporary crowns will be used so that appearance will not be impaired during the period of treatment.

Further, it is explained that from photographs and impressions of the upper and lower anterior teeth to be taken at this first visit, a model of the teeth will

be constructed on which all preliminary work can be carried out (illustration, A). Teeth on the model will be prepared for wax jackets, and these jackets will be shown for approval before any actual reduction of crowns is begun.

The laboratory procedure after the first visit consists of the following steps:

1. The impressions are poured, and when the stone has set, the models are duplicated twice.
2. The models are mounted on articulators.
3. The preparations are cut on one model (illustration, B). This procedure makes it possible to appraise the esthetic possibilities. Care must be taken to prepare the model teeth in the same manner as would be employed in the mouth. Likewise nearness to pulp chamber must be estimated carefully, as this is the determining criteria of the esthetic improvement that can be made.
4. The jackets are prepared in white wax on the model (illustration, C).
5. The impression of this model is poured in stone so that like composition may facilitate a truer evaluation of the before and after models.
6. The temporary crowns are constructed, with the model serving as guide for selection and trimming of crown forms. This eliminates excessive trauma to the soft tissues in the mouth.
7. The copper bands are fitted on the model.

Second Visit • At the second visit, the models are shown to the patient and further questions answered. When the patient is satisfied that appearance will be improved, further work is begun.

Because the reduction of a tooth is at best a traumatic experience, preparation is divided into two visits per tooth. On the first visit the bulk of the enamel is removed mesiodistally and buccolingually, a rudimentary gingival margin is established, the angles are rounded off, and the preparation polished. All of this work is done under local anesthesia.

A minimal amount of 4 per cent solution of the anesthetic is suggested as these operations are not prolonged. The use of a small amount of solution prevents bulging of the tissues in the anterior region and minimizes interference with the normal blood supply. Care must be taken to warm the anesthetic solution to body temperature before injection, and anesthesia must be given very slowly (about two minutes per .75 cc. of solution). On the second visit, when the shoulder is being formed, local injection of the marginal gingival tissue is advisable in addition to the normal block.

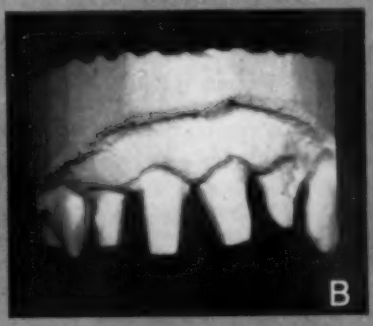
Constant irrigation should be used while the jacket preparation is made. If the operator is working alone, he can use one of the mechanical devices that work in conjunction with the handpiece, or he can hold a moist piece of a cotton roll in his left hand directly over the jacket being prepared and drip water on the area by exerting a little pressure on the cotton. If the operator is working with an assistant, the assistant should perform the irrigation.

The impression of the preparation should be made on the second visit, under anesthesia. Trimming and fitting of the copper band should be done on the model which was used to prefit temporary crowns. This procedure eliminates unnecessary try-ins in the mouth and preserves the gingival tissue.

In order to prevent cutting the periodontal membrane, care should be exercised to gauge the position where the copper band just covers the margins. After the band has been festooned properly, the operator uses a green compound or one of the dielectric compounds in as softened a state as possible without losing the inherent properties of the wax.

This compound is then chilled with ice water for a minute (longer chilling is not necessary as copper is such a good con-

A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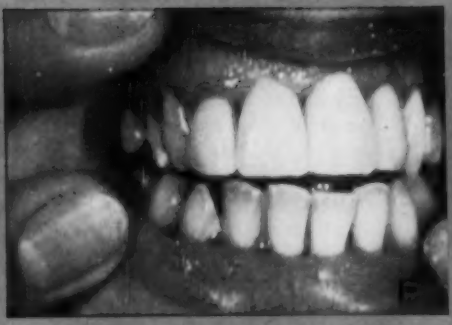
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ductor), the wax is allowed to return to mouth temperature, and the impression is removed. This repeated violent thermal change is dangerous pulpally, of course, and the greater the care taken in selecting and trimming the band, the fewer the chances of repeated impressions having to be taken. A cold alginate impression is taken of the preparation, and then a wax bite of the opposing teeth is made.

In the laboratory, impressions are copper plated, seated in a stone die, and mounted on the articulator. The jackets are then waxed up on the dies.

Third Visit • At the third visit, jackets are tried in the mouth in the wax-up (illustration, D). This is the most critical visit from the esthetic point of view. The jackets are placed and margins are checked to prove the accuracy of the die. The jackets are then carved further if necessary. Often a wax-up that appears perfect on the model is rather inharmonious in the mouth, perhaps because of the different environment, the shadows of the lips, or the presence of the actual living tissue.

After the wax-up is completed to the operator's satisfaction, the jackets are shown to the patient. It should be stressed that only shape is in question here, not color. The patient's criticism should be tempered by the operator's experience. Prominence is a common complaint, and the operator should re-emphasize that the color of the white wax is deceiving. A patient often feels that a certain tooth could be brought further lingually, but it is an easy task to remove the wax jacket and show the patient that the preparation cannot be cut any further without injuring the nerve.

Often, however, a patient can point out definite improvements in the shape, and whenever possible the patient's wishes should be followed. At times, a patient may feel so strongly about a certain change (as, for example, a diastema, or the closing of one) that the operator should be flexible enough to allow such a change if it is physiologically feasible. Taste is highly individual, and the operator should not set himself up as the ultimate authority on the personal appearance of his patient.

Care should be exerted to control the margin-consciousness of the dentist. Because he habitually pulls the lip up or down while inspecting or working on a tooth, he tends to present the tooth to the patient in this manner. It is preferable to let the lip fall naturally so as to present a normal and more natural esthetic appearance.

The color is selected at this third session, which should be in daylight. Checking of the dentist's color guide with that of the laboratory man, if one is used, may prevent unnecessary sittings.

The laboratory procedure after the third visit consists of finishing the jackets in the material chosen by the operator. The models and dies, carefully labeled, are stored to facilitate easy replacement in case the patient should break a jacket. The patient should be informed of this service, since it is reassuring to know that the same lengthy procedure will not be necessary should a jacket break.

Fourth Visit • At the fourth visit, the jackets are cemented. It is wise to have a range of colors of cements at hand and to color test the cements before final placement. Nothing is more discouraging than to have a good jacket ruined at the last minute by the wrong color cement. The testing may be done by mixing the powder with water.

After jackets are seated and cemented, the operator's attention should continue to be focused on the health of the investing tissues (illustration, E and F). The patient should return to the office to make certain that the marginal gingival tissue is not hyperemic or blanched in any area.

The lingual aspects of the teeth are checked for any high spots or shiny areas, and the jackets are given a final polish in

the mouth. After the jackets are completed, photographs are again taken and the patient is shown the results.

COMMENT

The procedures most valuable in multiple-jacket prosthesis may be recapitulated briefly. Psychologically, the patient should be carefully oriented regarding the procedures to come, through explanation in simple terms, by being shown photographs of other patients, and by being consulted and shown models of teeth in their initial condition and approximately as they will look when the work is finished. The patient should also be protected from excessive trauma by sessions that are not too long or strenuous.

Physiologically, the condition of the patient should be diagnosed carefully and both the esthetic improvement of the teeth and concomitant maintenance of good gingival health should be taken into consideration.

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Evanston dental caries study
XVII. Dental caries experience rates associated with boys and girls, white and negro children

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Many investigators of dental caries experience rates of the permanent teeth of boys and girls have found the girls had the higher rate.[1-9] Other investigators have not found this relationship.[10-13] When the rates were based on the number of carious and filled deciduous teeth present, the boys appeared to have higher caries rates than the girls.[14-19] However, Berk,[20] Allerbeck,[21] Roos[22] and Ainsworth and Young[23] found no appreciable difference in the caries rates of the deciduous teeth between boys and girls. Also, in comparing the number of caries-free teeth in specific age groups, it has been reported that white girls had fewer caries-free teeth than either white boys, negro girls or negro boys.[24-26] When comparing the caries rates among negro and white groups, available evidence indicates that negro children have less caries experience than white children.[24-27]

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Zoller Memorial Dental Clinic, University of Chicago.

1. Knutson, J. W., and Klein, H. Studies on dental caries; tooth mortality in elementary school children. Pub. Health Rep. 53:1021 June 24, 1938.

2. Klein, H., and Palmer, C. E. Studies on dental caries; sex differences in dental caries experience of elementary school children. Pub. Health Rep. 53:1685 Sept. 23, 1938.

3. Klein, H.; Palmer, C. E., and Knutson, J. W. Studies on dental caries; dental status and dental needs of elementary school children. Pub. Health Rep. 53:751 May 13, 1938.

4. Klein, H., and Palmer, C. E. Studies on dental caries; prevalence and incidence of dental caries experience, dental care, and carious defects requiring treatment in high school children. Pub. Health Rep. 55:1258 July 12, 1940.

5. Kaiser, Hilde, and East, Bion R. Association of dental caries in children with sex, age and environment. J.A.D.A. 27:1430 Sept. 1940.

As the Evanston Dental Caries Study has now made over 30,000 dental examinations of children 6 to 8 and 12 to 14 years of age, it was felt these examinations would yield data on dental caries experience rates to make worthy comparisons between the negro and white children, and boys and girls. This report, therefore, is concerned with the dental caries experience rates of 7,393 white children and 1,024 negro children examined in Evanston, Ill., in 1946, 1954 and 1955.

REVIEW OF LITERATURE

Klein and Palmer,[2] in studying differences in dental caries experience of elementary school boys and girls, reported that the average decayed, missing and filled permanent teeth per child to be 2.66 for the boys and 2.90 for the girls. Klein, Palmer and Knutson,[3] studied the dental needs of elementary school children in Hagerstown, Md., where 95 per cent of the children attend elementary schools and where the authors felt that distribution with respect to age and other characteristics were representative of many urban communities in the United States. They found that dental caries attacked one or more permanent teeth in 19.9 per cent of six year old girls and 12.3 per cent of boys of the same age. Kaiser and East[5] observed that in children 6 to 8, 9 to 11, and 12 to 14 years of age, "In the same age group the girls had more caries than the boys and those differences increased with age."

Klein,[28] in reporting on dental caries experience rates of children of Japanese ancestry in two war relocation centers, found in a control group examined in 1943 that the boys, ages 8 to 14 combined, had an average of 12.8 permanent teeth free of dental caries experience whereas girls 8 to 14 years as a group had an average of 14.1. Recall examinations made two years later (1945) showed in the control group that boys who were eight years of age at the first examination developed 44 new DMF teeth per hundred caries-free permanent teeth present in the mouth at the first examination whereas the girls developed about 36 new decayed, missing and filled permanent teeth.

6. Sloman, E. G. Sex and age factors in the incidence of dental caries. J.A.D.A. 28:441 March 1941.

7. Brekhus, P. J. A second census of dental conditions in University of Minnesota freshman students. J.A.D.A. 28:1126 July 1941.

8. Hadjimarkos, D. M., and Storvick, C. A. Incidence of dental caries among freshman students at Oregon State College. J.D.Res. 27:299 June 1948.

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11. Marshall-Day, C. D., and Sedwick, H. J. Studies on the incidence of dental caries. D. Cosmos. 77:442 May 1935.

12. Sappington, C. O. The incidence of dental defects in 2,469 employment examinations. J.A.D.A. 15:2170 Nov. 1928.

13. Kloser, K. Zur Statistik der Zahnkaries. Deut. Mschr. Zahnheilk. 31:585, 1913.

14. Munblatt, M. A. A critical study of the incidence of dental caries in children. D. Cosmos 75:592 June 1933.

15. Stoughton, A. L., and Meaker, V. T. Sex differences in the prevalence of dental caries; based on 12,435 oral examinations by dental personnel in Georgia, Illinois, Missouri, and Hagerstown, Md. Pub. Health Rep. 47:26 Jan. 1, 1932.

16. Clements, F. W., and Kirkpatrick, R. M. Medical and dental surveys of school and pre-school children in N.S.W. Nutrition in relation to dental health. II. Dental survey. D.J.Australia 10:418 July 1, 1938.

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20. Berk, Harold. Some factors concerned with the incidence of dental caries in children: multiple pregnancy and nutrition during prenatal, postnatal and childhood periods. J.A.D.A. 30:1749 Nov. 1943.

21. Allerbeck, H. H. Die Zahn und Mundverhältnisse der Kleinkindern und der 6-9 jährigen Volkschüler der Stadt Bielfeld. Dissertation, Münster, 1939.

22. Roos, B. Über die Karies des Milchgebisses bei Kleinkindern mit besonderer Berücksichtigung den Bedeutung einiger sozialen und medizinischen Faktoren; eine sozialmedizanische Studie aus Südschweden. Acta. paediat. (Supp. 1) 31:1, 1944.

23. Ainsworth, N. J., and Young, M. Reports of the committee for the investigation of dental disease. II. The incidence of dental diseases in children. Medical Research Council, special report series no. 97. London, Medical Research Council, 1925.

24. Brucker, Marcu. Studies on the incidence and cause of dental defects in children. VIII. The deciduous molars caries incidence. J.D.Res. 29:148 April 1950.

25. Blackerby, P. E., Jr. Comparative analysis of dental conditions among white and negro children of rural and semirural communities. J.A.D.A. 26:1574 Sept. 1939.

26. Sebelius, C. L. Variations in dental caries rates among white and negro children. J.A.D.A. 31:544 April 1944.

A review of literature presented by Finn[29] indicated that caries in the permanent dentition is more prevalent in females than in males. Cohen[19] reported that the girls seemed to have slightly better permanent teeth up to about 13 years of age at which time the record of the boys was better than the record of the girls.

Knutson and Klein[1] found among 2,232 boys and girls, 6 to 15 years, the number of lower first permanent molars missing (extracted because of caries) per hundred persons to be 23.3 for the boys and 29.2 for the girls. In children of high school age, Klein and Palmer[4] reported that of 299 12-year-old boys examined, 91 permanent teeth were extracted because of caries whereas of 297 girls 12 years of age, 119 permanent teeth were extracted. The 13 year old boys (267 examined) lost 138 permanent teeth whereas the girls (278 examined) lost 170 permanent teeth. Of the 14 year old children, 199 boys lost 111 permanent teeth and 165 girls lost 113 permanent teeth because of caries.

Concerning teeth attacked by dental caries, Sloman[6] stated that at age 18 the boys had 24.1 per cent (based on 32 teeth) whereas the girls had reached 28.4 per cent. Brekhus,[7] in studying University of Minnesota freshman students, reported that in 1939, 1.34 per cent of the men had a perfect mouth condition whereas 0.9 per cent of the women demonstrated this condition. Hagan,[30] Hadjimarkos and Storvick,[8] and Fulton and Price[9] in their respective studies all reported the girls to have the highest dental caries experience rates.

Kloser[13] reported the similarity of caries attack rates of 33,098 boys and 32,699 girls of school age in Germany and found little difference in the condition of the teeth in the two sexes. Marshall-Day and Sedwick[11] found that caries was less frequent in girls than boys on the basis of the number of teeth present in the mouth. They observed, however, that teeth erupted earlier in girls.

In regard to deciduous teeth, the dental caries experience rates, when based on the number of carious and filled teeth present, indicated as reported by Finn[29] that boys had higher rates when compared to those of girls. Cohen[19] observed, however, that girls had slightly more perfect deciduous teeth up to age six but after age six the teeth of boys seemed to be slightly better than those of the girls. No appreciable differences in the caries rates in the deciduous teeth between the sexes were reported by Berk,[20] Allerbeck,[21] Roos[22] and Ainsworth and Young.[23] Savara and Suher,[31] in studying the caries rates of children one to six years of age, reported that no significant sex differences were found.

In a summarizing statement, concerning the differences in the dental caries experience rates of permanent and deciduous teeth of boys and girls, Finn[29] stated,

> When both dentitions are considered, even though females have a higher permanent tooth morbidity, males have a higher caries experience after about seven years of age because of the longer retention of carious deciduous teeth, which are exfoliated later in males. . . . If one considers all teeth of all age groups, one can state that the caries experience appears to be higher in males in the younger ages and higher in the females in the older age groups.

Finn[29] has presented evidence that indicates rather definitely that the prev-

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28. Klein, H. Dental caries experience in relocated children exposed to water containing fluorine; incidence of new caries after 2 years of exposure among previously caries-free permanent teeth. Pub. Health Rep. 60:1462 Dec. 7, 1945.

29. Finn, S. B. Prevalence of dental caries. In Survey of the literature on dental caries. Publication 225, National Academy of Sciences, Washington, D. C., National Research Council, 1952, p. 117-173.

30. Hagan, T. L. Dental caries prevalence and tooth mortality—study of 24,092 Georgia children in 12 communities. Pub. Health Rep. 62:1759 Dec. 19, 1947.

31. Savara, B. S., and Suher, Theodore. Incidence of dental caries in children 1 to 6 years of age. J.D.Res. 33:808 Dec. 1954.

alence of dental caries among negro children is lower than among white children of comparable age. Lathrop,[27] in clinical and roentgenographic examinations of 144 girls at Letchworth Village, found that in girls 12 to 15 years of age, the American white girls had 30.3 per cent carious teeth whereas the negro girls had 25.9 per cent. Marshall-Day and Sedwick[11] examined 433 children 13 years of age in Rochester, N.Y., and found that the negro portion of the group had the lowest caries index. Knutson,[32] in studying dental caries experience rates among 1,272 Baltimore negro children between ages 6 to 12, reported an average DMF rate for the permanent teeth of 1.26, which is lower than reported by Klein, Palmer and Knutson[3] at Hagerstown or by Knutson[33] at Nicollett County, Minn., for white children of the same age.

Finn[29] cited Stadt, who, in summarizing data from examinations in Charlotte, N.C., in children between 6 and 16 years of age, found that the white children had an average DMF rate of 4.79 teeth and a def rate of 3.74 teeth per child whereas the negro children had an average DMF rate of 3.44 teeth and a def rate of 3.26 per child.

Brucker,[34] examining 7,447 white and 1,822 negro children 6 to 16 years of age, found 9.9 per cent of the white and 22.5 per cent of the negro children to be caries free. McRae[35] examined 3,188 white and 1,096 negro children in the first six grades of schools in Shelby County, Tenn., and found that 73.7 per cent of the white children had experienced decay whereas 41 per cent of the negroes had a similar caries experience.

Brucker,[24] in reporting on white boys and girls, and negro boys and girls, found in children four to seven years of age that 60.9 per cent of the first deciduous molars examined were caries free in the white boys and 46.8 per cent in the white girls; the negro boys had 69 per cent caries free and the negro girls had 73.9 per cent. The incidence of caries was higher in the white children than in the negro children.

Blackerby[25] found that dental health conditions among negro children in rural and semirural communities of Tennessee were generally better than those of white children of same or similar communities. The racial differences were most pronounced in the ages of 6 to 14 years and tended to become less noticeable with increasing age. Sebelius,[26] in reporting on dental conditions of children from 24 counties in Tennessee, stated that his analysis of the total dental caries experience showed significantly higher rates among white children than among negro children. He also pointed out that even though the negro children had a significantly lower dental caries experience rate, the negro children had lost more permanent teeth than the white children.

METHOD

The method and general outline of the Evanston Dental Caries Study has been previously reported.[36] For this report dental caries experience rates of white girls are compared to white boys; negro girls to negro boys; white girls to negro girls; white boys to negro boys and white children as a group to negro children as a group.

The students six to eight years of age were examined in 1946 and 1955, and the students 12 to 14 years of age were examined in 1946 and 1954. Although some of the students examined in 1954 and 1955 have been exposed to fluori-

32. Knutson, J. W. Index of prevalence of dental caries in school children. Pub. Health Rep. 59:253 Feb. 25, 1944.

33. Knutson, J. W. Simplified procedure for collection of basic data for dental program planning and appraisal. J. Am. Pub. Health A.37:1439 Nov. 1947.

34. Brucker, M. Studies on the incidence and cause of dental defects in children. V. Freedom from caries. J.D.Res. 22:469, Dec. 1943.

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36. Blayney, J. R., and Tucker, W. H. Evanston dental caries study. II. Purpose and mechanism of the study. J.D.Res. 27:279 June 1948.

dated water whereas the students examined in 1946 have not, in this report no attempt has been made to limit the examinations to continuous resident children. There is no comparison of rates for the prefluoridation group (1946) examinations to those of the postfluoridation group of examinations.

All dental examinations were done in the Evanston schools. Roentgenographic films, consisting of three maxillary anterior and three mandibular anterior apical views as well as two posterior bitewing films on each side of the mouth for the older aged children and one posterior bitewing film on each side of the mouth for the younger children, were taken at the time the clinical examination was scheduled. The clinical examination and roentgenographic interpretation were made by experienced dentists with special training in dental examination to help insure uniform interpretation of conditions found in the mouth. For this report dental caries experience rates per hundred children of the deciduous and permanent teeth of the 6 to 8 and 12 to 14 year old children are presented.

Table 1 • Dental caries experience rates in permanent teeth of boys and girls, white and negro children six years of age

	DMF rate per hundred children			
	Exam.	1946	Exam.	1955
White boys	160	38.13	439	10.02
White girls	170	51.76	388	13.66
Negro boys	23	39.13	66	7.58
Negro girls	29	37.93	67	13.43
White children	330	44.95	827	11.84
Negro children	52	38.53	133	10.51

Table 2 • Dental caries experience rates in permanent teeth of boys and girls, white and negro children seven years of age

	DMF rate per hundred children			
	Exam.	1946	Exam.	1955
White boys	313	143.77	396	43.43
White girls	296	166.89	344	75.29
Negro boys	44	129.55	70	17.14
Negro girls	29	151.72	52	55.77
White children	609	155.33	740	59.36
Negro children	73	140.64	122	36.46

Table 3 • Dental caries experience rates in permanent teeth of boys and girls, white and negro children eight years of age

	DMF rate per hundred children			
	Exam.	1946	Exam.	1955
White boys	321	230.22	488	128.48
White girls	303	280.26	502	159.16
Negro boys	30	150.00	73	69.86
Negro girls	36	219.44	67	114.93
White children	624	255.24	990	143.82
Negro children	66	184.72	140	92.41

FINDINGS

Six to Eight Year Old Group—Permanent and Deciduous Teeth • The white girls, six, seven and eight years of age (Tables 1-3) had a higher dental caries experience rate in permanent teeth than the white boys of that age. The negro girls had a higher rate than the negro boys in the six year old group in 1955 and also in the seven and eight year old groups in 1946 and 1955. In 1946 the six year old negro girls had a lower rate than did the negro boys of the same age. In comparing the dental caries experience in permanent teeth of the white girls to the negro girls, it is noted in Tables 1, 2 and 3 that the rate of the white girls was greater than that of the negro girls.

It should be brought to attention that in comparing the dental caries experience rates in permanent teeth of the white boys to that of the negro boys, the negro boys had a lower rate than the white boys of the same age in all instances except one, where the six year old negro boys of 1946 (Table 1) had a rate slightly greater than that of the white boys. The six, seven and eight year old white children as a group (boys and girls) had higher dental caries experi-

Table 4 • Dental caries experience rates in deciduous teeth of boys and girls, white and negro children six years of age

	def rate per hundred children			
	Exam.	1946	Exam.	1955
White boys	160	450.00	439	397.26
White girls	170	497.65	388	425.25
Negro boys	23	495.65	66	442.42
Negro girls	29	396.55	67	335.82
White children	330	473.83	827	411.26
Negro children	52	446.10	133	389.12

Table 5 • Dental caries experience rates in deciduous teeth of boys and girls, white and negro children seven years of age

	def rate per hundred children			
	Exam.	1946	Exam.	1955
White boys	313	535.78	396	478.79
White girls	296	584.46	344	471.51
Negro boys	44	413.64	70	361.43
Negro girls	29	479.31	52	521.15
White children	609	560.12	740	475.15
Negro children	73	446.48	122	441.29

Table 6 • Dental caries experience rates in deciduous teeth of boys and girls, white and negro children eight years of age

	def rate per hundred children			
	Exam.	1946	Exam.	1955
White boys	321	557.63	488	545.29
White girls	303	599.34	502	561.16
Negro boys	30	400.00	73	482.19
Negro girls	36	519.44	67	525.37
White children	624	578.49	990	553.23
Negro children	66	459.72	140	503.78

ence rates than the negro children in 1946 and 1955 (Tables 1-3).

The dental caries experience rates in deciduous teeth, shown in Tables 4, 5 and 6, indicate that the white girls had a higher rate than the white boys in 1946 and 1955 for the six year old groups, a greater rate in 1946 but not in 1955 for the seven year old children (Table 5), and a greater rate in 1946 and 1955 for the eight year old group (Table 6). The six year old negro girls in 1946 and 1955 had a lower deciduous dental caries rate than the negro boys (Table 4).

The seven and eight year old negro girls had higher rates than the negro boys in 1946 and 1955 (Tables 5 and 6). The white girls had a greater dental caries experience rate in deciduous teeth than the negro girls in all instances except one, for in 1955 (Table 5), the seven year old negro girls had a rate of 521.15 per hundred children whereas the white girls of the same age had a rate of 471.51 per hundred children. When the white boys are compared to the negro boys, it is seen that the six year old negro boys had a higher rate in 1946 and 1955 than the white boys six years of age. The seven and eight year old negro boys (Tables 5 and 6) had a lower rate in 1946 and 1955 when compared to the white boys seven and eight years of age.

When comparing the dental caries experience in deciduous teeth of the white children as a group to the negro children as a group, it was found that the white children had a higher caries rate in 1946 and 1955. The differences, however, were not statistically significant.

Twelve to Fourteen Year Old Children —Permanent Teeth • The white girls 12, 13 and 14 years of age examined in 1946 and 1954 (Tables 7-9) had a higher permanent teeth dental caries experience rate than that of the white boys of the same age. The difference was considered statistically significant. The negro girls 12 years of age examined in 1946 had a higher DMF rate than the negro boys of the same age. In 1954, however, the rates were comparable. The 13 year old negro girls had a higher rate than the 13 year old negro boys in 1946 but in 1954 the negro girls had a lower rate than the 13 year old negro boys (Table 8). The 14 year old negro girls had a lower rate than the 14 year old negro boys in 1946 and again in 1954; however, in 1954 the difference was slight (Table 9).

In comparing the dental caries experi-

ence rate in permanent teeth of the white girls to the negro girls of 12, 13 and 14 years of age (Tables 7, 8 and 9), it can be noted that the white girls had the highest rates in all instances. The differences were considered statistically significant. The negro boys had a lower permanent tooth dental caries experience rate than the white boys in all instances except one, where the 13 year old negro boys in 1954 (Table 8) had a rate slightly higher than the rate of the white boys.

It was noted that when comparisons were made of the white students to the negro students, the negro students had a lower caries experience rate than the white students for the three specific ages in 1946 and in 1954. These differences were considered statistically significant.

The dental caries experience rates of the deciduous and permanent teeth of the combined six to eight year old group, and the permanent teeth of the combined 12 to 14 year old group, by sex, race and year are shown in Table 10.

Table 7 • Dental caries experience rates in permanent teeth of boys and girls, white and negro children twelve years of age

	DMF rate per hundred children			
	Exam.	1946	Exam.	1954
White boys	154	704.55	378	541.53
White girls	160	828.75	384	662.50
Negro boys	31	577.42	53	415.09
Negro girls	16	737.50	41	407.32
White children	314	766.65	762	602.02
Negro children	47	657.46	94	411.21

Table 8 • Dental caries experience rates in permanent teeth of boys and girls, white and negro children thirteen years of age

	DMF rate per hundred children			
	Exam.	1946	Exam.	1954
White boys	292	924.32	313	715.97
White girls	266	1,103.76	342	899.12
Negro boys	34	894.12	49	724.49
Negro girls	35	985.71	24	687.50
White children	558	1,014.04	655	807.55
Negro children	69	939.92	73	706.00

Table 9 • Dental caries experience rates in permanent teeth of boys and girls, white and negro children fourteen years of age

	DMF rate per hundred children			
	Exam.	1946	Exam.	1954
White boys	268	1,121.27	235	996.60
White girls	228	1,257.89	253	1,153.36
Negro boys	44	1,079.55	43	834.88
Negro girls	28	957.14	40	822.50
White children	496	1,189.58	488	1,074.98
Negro children	72	1,018.34	83	828.69

DISCUSSION

The dental caries experience rates of the permanent teeth of the white girls 6 to 8 and 12 to 14 years of age were greater than those of white boy students of the same age. Klein and Palmer[2] also found a higher rate for the girls and suggested that this was due to the earlier eruption of the teeth of the girls and the teeth therefore were exposed longer to risk of attack by caries than were the boys. They concluded that girls show no greater susceptibility to dental caries attack than boys.

Sloman[6] found differences in caries rates of boys and girls. He stated that differences in susceptibility to dental decay may be due to earlier eruption of teeth of girls, but felt it was but a small factor.

Boyd and Cheyne[10] also observed a greater incidence of caries among girls than boys in studying children from six custodial institutions in Iowa. They stated that they could not relate the differences in instances of caries as being due to the posteruptive age of the teeth but attributed the sex differences to the poorer habits of eating encountered in the girls. It was concluded in their study of children living under conditions of regimentation that no sex differences in caries experience could be established.

Cohen,[19] in studying the dental caries experience in permanent teeth of 1,372

boys and 1,182 girls, found that the girls seemed to have slightly better teeth up to about age 13, at which time the record of the boys became a little better than that of the girls. In contrast, Kaiser and East,[5] in reporting on some of the figures based on dental examinations of one half million school children examined by dentists of the U. S. Public Health Service and state units of the American Dental Association reported, "In the same age group, the girls have more caries than boys, and these differences increase with age."

Klein,[28] in studying the dental caries experience in relocated children of Japanese ancestry, found that the boys had developed 44 new DMF teeth per hundred caries-free permanent teeth whereas the girls had developed about 36 in a period of two years between examinations. These people were in a war relocation center where living conditions were apparently the same day after day. These conditions may be compared somewhat to the conditions associated with the six state institutions reported by Boyd and Cheyne[10] in which they found no great differences in caries experience between the sexes. As pointed out by Boyd and Cheyne, regimentation of living conditions, freedom from certain emotional stresses, regularity and adequacy of the diet may modify caries experience.

The observations on deciduous teeth shown in this report indicate that the girls had the higher rate when compared to the boys. The differences, however, were not considered significant. Savara and Suher[31] reported that they found no differences of any significance between the rate of the boys and the girls one to six years of age, although Cohen[19] reported that up to about age six the girls had slightly more perfect deciduous teeth than the boys, but after age six the deciduous teeth of the boys seemed to be slightly better than those of the girls.

When the differences in dental caries experience rates in deciduous teeth of the white and negro children have been compared, as a group the white children have had the higher rate. Sebelius,[26] in studying rates of white and negro children, found that a statistical analysis of total dental caries experience (presumably deciduous and permanent teeth) showed significantly higher rates among white children than among negro children. Also children

Table 10 • Dental caries experience of white and negro children by sex, race and combined age groups examined in 1946, 1954 and 1955. Rates are per hundred children

	Exam.	def	DMF	Exam.	def	DMF
	6 to 8 year old children*					
	1946			1955		
White boys	794	514.47	137.37	1,323	473.78	60.64
White girls	769	560.48	166.50	1,234	485.97	82.70
Negro boys	97	436.43	106.23	209	428.68	31.54
Negro girls	94	465.10	136.36	186	460.78	61.38
	12 to 14 year old children†					
	1946			1954		
White boys	714		916.71	926		751.37
White girls	654		1,063.46	979		904.99
Negro boys	109		850.36	145		658.15
Negro girls	79		893.45	105		639.10

*Rates are the arithmetic average of the three specific ages (6, 7 and 8).
†Rates are the arithmetic average of the three specific ages (12, 13 and 14).

aged 9 to 11 years showed differences which were greater in the deciduous teeth rates than those differences found between white and negro children in the permanent teeth. Brucker,[24] in tabulating the number of first and second, upper and lower, deciduous molars which were caries free, those teeth free of caries and with no operative work ever performed on them, reported that at age four to seven years the negro children had a greater number of caries-free teeth than did the white children.

The negro children 12, 13 and 14 years of age in this study had a lower dental caries experience rate associated with the permanent teeth than did the white children of the same age. This apparently is in agreement with findings of researchers as reported by Finn.[29]

Blackerby[25] pointed out that racial differences were most pronounced in ages 6 to 14 and tended to become less noticeable with increasing years. The number of extracted teeth plus teeth indicated for extraction per hundred children among negro children of the lower age groups, however, was found to be slightly less than that of the white children of the same ages, but in the 15 to 17 year age groups the negro children had a lost permanent tooth index (teeth extracted plus teeth indicated for extraction) of 47.7, whereas the white children had an index of 24.1.

Sebelius[26] reported that, in regard to lost permanent teeth per hundred children, negro children had lost more permanent teeth than had the white children. Up to and including the eleventh year of age, however, the negro students had lost less than the white children. In the 12 to 14 year group and the 15 to 17 year group, the negro students lost more than the white students. This may be one of the reasons that racial differences as found by Blackerby[25] were most pronounced in ages 6 to 14 years and tended to become less noticeable with increasing age, as the negro child is sometimes without dental treatment whereas the white children usually have an opportunity to save carious teeth by restorative procedures during their early years. As the difference in the socioeconomic status of the white and negro races diminishes, it should be of interest to observe whether the difference in caries prevalence rates decreases proportionately.

SUMMARY

A study was made of the dental caries experience of white and negro children 6 to 8 and 12 to 14 years old in Evanston, Ill., in 1946, 1954 and 1955.

In six, seven and eight year old children with permanent and deciduous teeth, the following observations were made:

1. White girls six, seven and eight years of age, as a group, had a higher dental caries experience rate in permanent teeth than white boys. The difference was considered statistically significant.

2. Negro girls six, seven and eight years of age, as a group, had a higher dental caries experience rate in permanent teeth than the negro boys. The difference was considered statistically significant.

3. The white boys six, seven and eight years of age, as a group, had a higher dental caries experience rate in permanent teeth than the negro boys. The difference was considered statistically significant.

4. The white children six, seven and eight years of age, as a group, had a higher dental caries experience rate in permanent teeth than the negro children six, seven and eight years of age as a group. The difference was statistically significant.

5. Although the differences in the dental caries experience rates of the deciduous teeth were neither consistent in their direction, nor statistically significant by individual age groups, nevertheless, the differences for the six, seven and

eight year old children as a combined group appeared to be real.

The following observations were made concerning the permanent teeth in 12, 13 and 14 year old children:

1. The white girls, as a group, had a higher dental caries experience rate in permanent teeth than the white boys as a group. The difference was considered statistically significant.

2. Negro girls 12, 13 and 14 years of age, as a group, had a dental caries experience rate in permanent teeth comparable to that of the negro boys.

3. White girls had a greater dental caries experience rate in permanent teeth than the negro girls. The difference was statistically significant.

4. White boys had a greater dental caries experience rate in permanent teeth than the negro boys. The difference was considered statistically significant.

5. White children, as a group (boys and girls), had a greater dental caries experience rate in permanent teeth than negro children. The difference was considered statistically significant.

950 East Fifty-ninth Street

Orthopedic problems of the dentist

Emil D. W. Hauser, M.D., Chicago

Members of the dental profession, who confine their efforts to the region of the oral cavity, sustain physical and nervous strains which make them ready candidates for orthopedic care. Man today lives in an age of speed and tension, both of which have taken a heavy toll in the dental and medical professions. Coronary disease and hypertension are among the more serious diseases of this period. More common are the disturbances of the weight-bearing areas. Of these, the foot usually is the first to give out.

Constant standing in one position under tension results in foot strain. This expresses itself as pain in the muscles of the leg, pain over the longitudinal arch and pain in the ball of the foot. As a result of fatigue the legs feel heavy and there are stiffness and soreness in the muscles, particularly when a person starts to walk after resting. When the muscles tire, the body weight is exerted on the ligaments between the bones of the foot. This sets up a local inflammation and sharp pain may occur over the longitudinal arch. Undue pressure is exerted on the anterior part of the foot, causing it to spread. This may lead to deformity of the great toe with a bursitis—a so-called "bunion."

Sometimes pressure occurs in the region of the fifth toe, giving rise to the so-called "tailor's bunion." As the foot flattens and elongates, the short muscles to the toes contract and cause hammertoe. These toes rub against the shoes and thus lead to painful corns. Prolonged standing causes a vascular congestion and, if continued, may result in varicose veins. An edematous swelling of the foot and ankle occurs. If the circulatory condition is severe and prolonged, chronic ulcers can result.

In the knees, prolonged strain may give rise to an inflammation of the bursa on the medial side of the knee, a painful condition. Prolonged strain may set up a traumatic type of inflammation within the joint. This gives rise to chronic hypertrophic arthritis. The tendency to this type of arthritis is increased with each decade of the dentist's life.

The back, too, suffers from static strain. At first there is a muscle tiredness and soreness. This may be succeeded by an inflammation at the lumbosacral or sacroiliac articulation. This inflammation gives rise to a painful muscle spasm. Movement in the back becomes limited. The inflammation may give rise to an irritation of the nerves in the region of the lower part of the back. This may cause referred pain in the groin, the thighs and all the way down the lower extremities. All these conditions are troublesome and ultimately may become disabling.

CAUSE AND CORRECTION OF FLATFOOT

Flatfoot is the result of an alteration in the position of the bones of the foot in relation to each other. The heel is turned out (valgus); the lateral border of the foot is higher than the medial (pronation); the anterior part of the foot is displaced laterally, or abducted (Fig. 1, above). This alteration is the result of an imbalance between the strength of the foot and the load, or the demands made on the foot. If the dentist is overweight, or if he stands for a long period of time, this imbalance may arise. Usually, relief is attempted by supporting the foot with arch supports. These act as a crutch, relieving the strain but increasing the weakness. If the longitudinal arch is flattened, the foot spreads and lengthens. The spread of the foot causes a distortion of the great toe and sometimes of the fifth toe. This distortion of the great toe, or

Fig. 1 • Above: Pes valgoplanus (flatfoot). Below left: Hallux valgus with bursitis. Below center: Contracted toe with corn. Below right: Callus, plantar surface of the foot

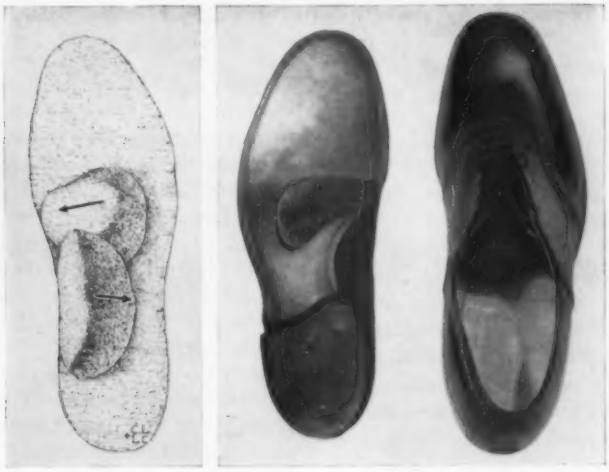

Fig. 2 • Left: Pads to form inclined planes. Right: Shoe with outside correction

hallux valgus, may result in a bursitis or bunion (Fig. 1, below left). When the longitudinal arch drops, the foot is lengthened and the short flexor muscles of the plantar surface of the foot contract the toes (Fig. 1, below center). In the formation of a bunion, the first metatarsal head is displaced dorsally. The middle metatarsal heads thus protrude plantarward. Pressure over these metatarsal heads results in a callus (Fig. 1, below right).

To correct flatfoot, the heel must be brought into a varus position and the normal position of the metatarsal head must be restored. This can be done by placing a smooth pad made of soft felt under the longitudinal arch. The pad is formed to make an inclined plane from the medial side of the foot to the lateral side. To restore the normal position of the anterior part of the foot, a felt pad is shaped to form an inclined plane directed from the lateral border to the medial side. The pad is placed immediately posterior to the fourth, third and second metatarsal heads (Fig. 2, left). A more effective way to bring about this corrected position of the foot is to apply the corrective forces (inclined planes) to the sole of the shoe. An advanced heel with an eighth of an inch elevation on the inner border is used. A comma-shaped bar, higher on the outer side than the inner side, is fastened to the outer sole just posterior to where the metatarsal heads would rest (Fig. 2, right). With the foot brought into normal position the patient is taught to walk correctly. This means standing tall, rolling from the heel off the toe, that is, a so-called heel and toe gait.

Occasionally the dentist suffers an acute strain of his foot. The ligaments become inflamed. To correct this, the heel is drawn into varus and the arch is supported by means of an adhesive bandage (Fig. 3). If the deformity of the great toe (hallux valgus) is extreme and of long standing, it becomes fixed and requires surgical correction. For this the author has devised a reconstruction operation. Figure 4 shows a foot with hallux valgus before (A) and after (B) the operation.

BACK STRAIN AND ITS CORRECTION

The back is used in standing and sitting. Prolonged standing in awkward positions will cause back strain. If the muscles of the back and abdomen are weak, this strain will appear more readily. Strain in the back expresses itself by aches and stiffness. Excessive strain will involve the ligaments and joints. Since there is an angle at the lumbosacral joint, shearing force is apt to cause an inflammation in this region. The upright position of the body is dependent on bones, ligaments, muscles and nerves. A disturbance in any of these structures will give rise to weakness and strain. Inflammation of the ligaments causes localized pain. Continuous irritation sets up a reflex spasm; the muscles contract to form a protective mechanism (Fig. 5, left). When there is no muscle spasm the body tends to slump. This means an increase of the normal dorsal curve and the normal lumbar curve (compare A and B in Fig. 5, center). The symptoms of chronic and acute back strain arise most frequently at an age when active exercise gradually has been discontinued. Such symptoms most frequently occur between the ages of 25 and 40 years.

To correct this back condition it is necessary to relieve the strain, correct the deformity and increase the strength. Strain can be relieved by periodic rest. The day can be divided in half with a rest of 20 minutes at noon, and in quarters by resting in the middle of the morning, at noon, and in the middle of the afternoon. Frequent short periods of rest are more effective than long periods. Resting for one long period has a tendency to increase the back weakness. The deformity may be corrected by means of a plaster of paris jacket applied with the patient extended and leaning forward (Fig. 5, right, A). In this position the normal lumbar curve is re-established. The cast then fixes the normal position of the lumbar curve. When the patient stands erect, he automatically corrects the dorsal curve (Fig. 5, right, B). The cast is form fitting, comfortable and relieves the strain at the lumbosacral joint. The manner of application makes the wearer of the cast use his muscles more than before the cast was applied. It permits him to be ambulant (Fig. 6). To further increase the strength of the muscles, exercises are prescribed (Fig. 7). In this way the chronic and acute back strain to which the dentist is subject can be corrected.

Fig. 3 • Simple bandage for foot strain

Fig. 4 • Hallux valgus. A. Before reconstruction operation. B. After reconstruction operation

NEED FOR REST AND EXERCISE

More important is the prevention of these conditions, or prophylactic treatment. High on the list of prophylactic therapeutics is periodic rest. Frequent short periods of rest are effective. It is fatiguing to use the same muscles continuously under tension and without movement. Variation in the type of work is beneficial. If necessary, the work should be inter-

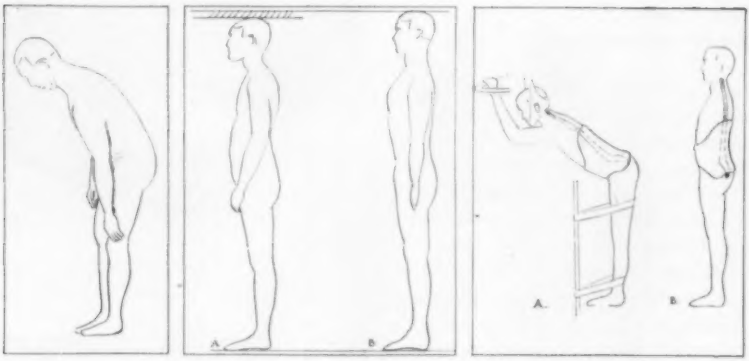

Fig. 5 • Left: Acute back strain. Center: A. Poor posture. B. Good posture. Right: A. Technic for applying plaster of paris cast. B. Corrected position

rupted long enough to change position and to stretch the muscles which are under tension. If possible, the work should be scheduled so that some change occurs about every two hours. During the lunch period, the dentist would be wise to lie down for from 10 to 20 minutes and give the muscles that control the feet, knees and back a chance to recover from fatigue.

Equally important to rest is exercise. Walking and standing correctly during the course of the day while at work and while going to and from work are physiologic exercises available to everyone. The exercise should be regulated by the individual's physical capacity. These exercises may be in the form of recreation or sports. The type of exercise should be adjusted to the circumstances. If time allows, golf is all right. For shorter periods, if a pool is available, swimming is excellent. Some people find it feasible to walk to and from work and this is their

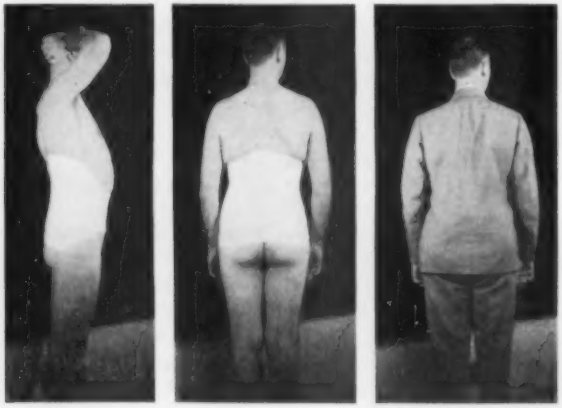

Fig. 6 • Form fitting cast for ambulant patient

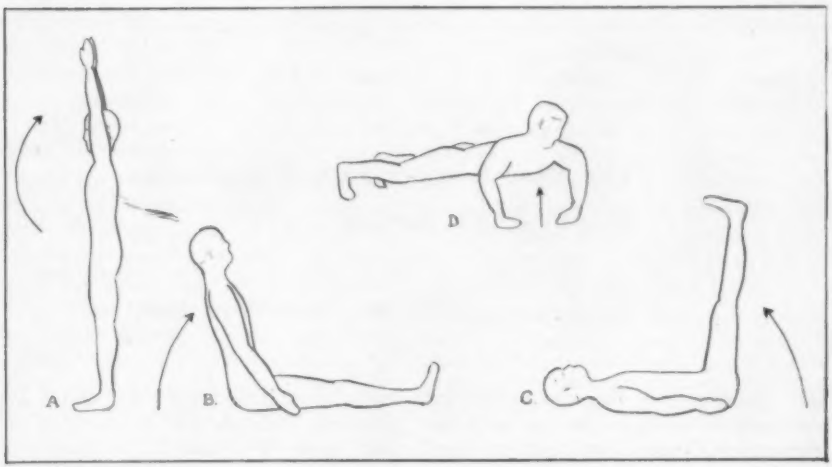

Fig. 7 • Exercises to strengthen the back: A. Arms raising forward and upward. B. Sit up. C. Leg raising. D. Push up

primary source of exercise. Sports or games which bring the individual into the outdoors and sunshine are advantageous. Work should not be so absorbing that there is not time enough to visit with family and friends. Vacations are essential. They are the best form of life insurance. Everyone should have an avocation. This makes for more successful vacations.

It is important to live while working, and to decrease gradually a person's occupational demands as he grows older. That a person can work intensely for a certain period of years so that he can retire early is a faulty concept.

Life should be enjoyed as it goes along. It is important for the dentist to do his difficult work well and to take the best care possible of that which is his greatest investment, himself.

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Communication and Research • The fact is that there is no "fact" in science that is final or significant in itself. Work has meaning only as it is connected to the general fund of knowledge and to the extent that it is established as a base for further increase of knowledge. It gets so connected and established only by communication. No discovery is ever the work of one man or group of men, working in isolation from the concerns of the community of science as a whole. On the contrary, most discoveries are made simultaneously by two or more independent workers or groups of workers. ***Gerard Piel, Science, Censorship and the Public Interest.***

The relative importance of appliances in orthodontic therapy

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The simplest and frequently the best treatment an orthodontist can give his patient is advice which will alleviate, correct, or minimize any malocclusion that may be present. Advice to a preschool child may break a bad habit, instruction in the use of the tongue blade may correct an anterior cross-bite for the elementary school child, and aid in the proper eruption of teeth may be all that is necessary to eliminate malocclusion for a senior high school student. Interception of the factors producing malocclusion is one of the most important functions of both the general practitioner and the orthodontist, because it either eliminates the need for appliance therapy or reduces the duration and complexity of orthodontic treatment.

For those patients whose orthodontic condition requires therapeutic intervention, the well-trained orthodontist has a variety of appliances which can best be adapted to treat the specific malocclusion. No appliance, however, is so automatic or so self-sufficient that it does not require careful supervision and proper adjustment to produce a satisfactory end result.

Because of the multiplicity of conditions requiring orthodontic supervision or treatment, it has become necessary to instruct the general practitioner of dentistry in the theory and practice of orthodontics—to provide them with a broad general understanding of the orthodontic problem. The adequacy of the basic orthodontic training in both general dentistry and orthodontics, and the application of this knowledge and experience to orthodontic problems, are primary. Appliances are only a means of implementing the prescribed treatment.

Mechanical ingenuity cannot treat malocclusion by itself any more than nonevaluated diagnostic tests can determine a diagnosis. Neither does the complexity of the appliance indicate the complexity of the malocclusion nor the ability of the operator. Furthermore it does not assure an excellent result. However, because certain schools and men limit their clinical instruction to one method of appliance therapy, the inference is sometimes given that there is only one type of appliance and that all other types are not efficient. The prominence occasionally given to the discussion of appliances is not justified because it misrepresents what is basic to any profession; namely, science, theory and art.

The role of an appliance in orthodontic therapy, then, is to carry out the treatment objectives in a given condition. When these objectives for treatment are recorded and the various tooth movements noted, the appliance most suited

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and adapted to accomplish these objectives should be selected.

Complicated appliances are not necessary to treat every type of malocclusion. In fact, many times dental deformities are treated satisfactorily without appliances by the timing of extractions, by the breaking of habits, by using muscle or speech exercises, or by altering of the eruption sequence of the teeth. More intricate appliances may use many bands which reduce the amount of space available for alignment, or they may have auxiliary springs and ligatures which contribute to the retention of food, the irritation of the mucobuccal surfaces, or the frequency of breakage. There is no ideal appliance, but a specific appliance may be ideally suited for an individual condition.

According to a recent poll by Germond,[1] about 19 per cent of the orthodontists in the United States use the labiolingual appliance, approximately 29 per cent use the Johnson appliance and around 36 per cent use the edgewise appliance with the remaining 16 per cent using various other types of appliances such as the Universal appliance, combinations of technics, and removable appliances. The labiolingual appliance appears to be used more generally by the older practitioners whereas the edgewise appliance is used more generally by those in practice less than 25 years. The Johnson twin arch appliance, however, is used by more than 25 per cent of the orthodontists in all age groups. The edgewise appliance was introduced by Edward H. Angle in 1929, the Johnson appliance by Joseph E. Johnson about 1932, the Universal appliance by Spencer R. Atkinson about 1933. The labiolingual appliance dates back to the earliest use of arches in orthodontics.

The success and perfection which an orthodontist has achieved in treating all types of malocclusion should indicate his ability, not the capability of the appliance he uses. There are men using all the various appliances who are successful because of their intelligent appraisal of oral and related conditions and their practical solution of the problems they handle.[2] It is, therefore, the ability of the man not the efficiency of the appliance that dentists are interested in, because all major orthodontic appliances in use today are therapeutically effective, otherwise they would have been discarded long ago.

Oren and William Oliver[3] stated:

> Nearly all [appliances] are similar in both design and function . . . [and] various forms of labial arches are found whether they be known as the round labial, the twin wire labial, the Universal appliance, the edgewise appliance or something else. In a similar manner, the lingual arch appliance is used in nearly all techniques in one form or another, whether it be soldered or removable, solid or tubular, one piece or sectional, wire or acrylic type.

APPLIANCES

The strictly labiolingual appliance is the simplest because usually a labial .040 arch is placed on one jaw and a lingual .040 arch on the opposite jaw, with elastic traction providing the activating force. Auxiliary finger springs make special contacts with individual teeth for specific movements. Teeth in more extreme positions, however, can be banded and ligated or otherwise connected to the arch wire for any desired movements.

Various auxiliaries such as the Oliver guide plane, cribs, plates and extraoral anchorage, sometimes add considerably to the space the labiolingual appliance occupies. Thus they could become a greater hygiene problem than if a full banded technic were employed.

When indicated, limited banding presents several advantages. Oral hygiene

1. Germond, R. C. Survey of current practice procedures. Am. J. Orthodont. 41:506 July 1955.

2. Hemley, Samuel. Clinical significance of tissue changes incidental to tooth movement. Am. J. Orthodont. 41:5 Jan. 1955.

3. Oliver, Oren A., and Oliver, William H. Reappraisal of labiolingual therapy. Am. J. Orthodont 39:109 Feb. 1953.

can be maintained more easily, appliances require less time to adjust or to change, pressures are lighter and more within physiologic limits, and more patients can be treated. Furthermore the appliances are less conspicuous to others and they are more comfortable to the patient. By banding only the molars, the forces of occlusion and the pressure of the tongue, lip, and cheek muscles are given the greatest latitude to mold and move the dentition into a position of balance. If all the teeth are banded, such forces are not active until the retainer stage. At the retainer stage, these forces may be less beneficial to the corrected occlusion but more effective in producing relapse because the arches were expanded during treatment without the guiding and controlling pressure of the surrounding musculature. Halderson and co-workers[4] stated:

> Relapse of any case is nothing more than a failure to place the teeth into a stable position of equilibrium among the forces acting on the denture. Until a great deal more work is done, we shall continue to see a few perfectly treated cases fail to retain well.

The Johnson twin-wire appliance is basically labiolingual in design, but, routinely, anterior bands are attached either to round twin wires of .010 resilient chrome or to one flat wire of either .010 by .022, or .011 by .022 in size. Additional bands are added as needed; this addition might place the use of the appliance in the category of a full banded technic if all teeth are banded. The resiliency of the fine wires accomplishes anterior alignment and tooth repositioning whereas the flat wires are effective for bodily movement or stability.

Movement of the buccal segments with the use of the Johnson twin-wire appliance or the plain labiolingual appliance is accomplished by applying elastic traction to the labial arch on which are placed coil springs or some type of stop. By varying the coil length, the wire diameter, the compression of the coil spring, the circumference and stretch of the rubber bands, practically any amount of pressure may be applied. However, only light forces of 2 to 4 ounces are now considered physiologically practical. In the past 20 years there has been a gradual reduction in the amount of force per unit recommended as well as a reduction in the amount of elastic traction used with all appliances.

Because the resiliency of the wires is active for considerable lengths of time, appointments should be spaced accordingly to allow tissue adjustment.

A summary of knowledge of the periodontal response to force application is given by Halderson, Johns, and Moyers[4] who stated:

> . . . . the response varies with the weight of the force, the duration of time that the force is applied, the direction of the force, and the distance the force is active. The rate of tooth movement is largely determined by the speed with which the periodontal membrane reestablishes circulation in the areas of pressure and tension. Simple movements, such as tipping, elicit rapid osseous changes whereas movements which occlude a large percentage of the periodontal circulation, such as bodily movement or intrusion, are completed only with difficulty.

It is important to point out that this naturally pertains to all appliances.

Usage and experience have altered, somewhat, the original edgewise appliance so that today sectional appliances, such as the Carey[5] sliding section, frequently replace the full arch wire to facilitate movement of groups of teeth. This technic reduces treatment time, takes much strain off the teeth used for stability, and gives the muscles enclosing the dentition a chance to mold the arches as treatment progresses. The edgewise appliance uses round, square, rectangu-

4. Halderson, H.; Johns, E. E., and Moyers, R. E. Selection of forces for tooth movement. Am. J. Orthodont. 39:25 Jan. 1953.

5. Carey, C. W. Force control in the movement of dental structures. Angle Orthodont. 14:47 July-Oct. 1944.

lar, or laminated flat wires which can apply force to any tooth to move it in any direction. However, this force usually acts in more than one tangent. Although this appliance exerts considerable pressure, it is effective because, as Halderson, Johns and Moyers[4] stated: ". . . the distance the force is active is relatively small, the movement precisely controlled, and the effective time rather short, pressure decreasing as time increases." By spacing appointments three to four weeks apart, as when the Johnson appliance is used, repair and adjustment can be made by the periodontal tissues.

Use of the edgewise and Universal appliances is indicated particularly where many or all teeth require movement of one type or another, where one or both jaws need maximum stability to prevent movement, or where bodily movement of the root is indicated. Axial repositioning, cusp interdigitation, individual or mass intrusions or extrusions, torque, and many other movements are particularly well accomplished by multibanded technics. Because each tooth is banded and ligated to the arch wire, several different movements can be accomplished simultaneously by local or general arch wire adjustments.

Where space is very critical, the use of many bands is usually contraindicated because the teeth are forced labially or buccally from their normal positions. If in such an instance a full banded technic is used, one to four extractions is frequently the only method to achieve alignment. If a mode of treatment requiring few bands is used, some patients might require no extractions because fewer bands take less space from the teeth needing repositioning and alignment. The edgewise and similar appliances demand a precise and painstaking technic requiring considerable chair time for the patient, which consequently limits somewhat the number of patients who can be treated.

Some clinicians have demonstrated that the extra rigidity and force embodied in the full banded appliances can effect more root resorption proportionately than other appliances.[6] Personal technics are probably important also, because, if long resilient spans for the Johnson twin-wire appliance are used without crimping or adaptation for extended periods, root resorption can also be detected. If, on the other hand, short spans of light, resilient, contoured twin wires are used for short periods of time, or if arch wires of multibanded appliances are manipulated to use their greater stress for a shorter period, root resorption is less likely to occur. Not all root resorption is due to orthodontic treatment because frequently the presence of root resorption is associated with systemic factors in patients who have never worn appliances.

PREVENTION OF MALOCCLUSION

Obviously it is best to prevent malocclusion from occurring, or if it has occurred, to treat it at its simplest stage. During the child's periodic dental visits, the general practitioner can observe and record the occlusion, compare changes between visits, and either prescribe necessary remedial measures himself or refer the patient to the orthodontist. In most instances the general practitioner is indispensable in this early detection. Furthermore he can contribute much toward the prevention of malocclusion by filling carious deciduous teeth early, by restoring the mesiodistal width of the tooth filled and by preventing space closure caused by the loss of deciduous teeth.[7] It has been observed by many that the deformities of the deciduous dentition are frequently carried over and exaggerated in the permanent dentition.

6. Moyers, R. E., and Bauer, J. L. Periodontal response to various tooth movements. Am. J. Orthodont. 36:572 Aug. 1950.

7. Waugh, L. M. Care of the deciduous teeth as the basis of occlusion of the permanent dentition. J. Canad. D. A. 21:75 Feb. 1955.

In a study of 103,570 St. Louis school children, Brandhorst[8] found that 51.9 per cent of all the children had some type of dental deformity, 17 per cent of the kindergarten children already showed deviations from the normal, and that 71 per cent of children in the twelfth grade had definite malocclusions.

With the increase in population, and increased demands for orthodontics, the answer to orthodontic care of the public does not lie in the fabricating of appliances, but in the prevention of malocclusion by early and accurate diagnosis, and by using the simplest appliances which require a minimum of chair time. According to McCall,[9] of 775 children examined, 38 per cent in the 2 to 6 year age range had malocclusion, and 60 per cent in the 7 to 11 age range had malocclusion. These figures do not necessarily mean that treatment is indicated in each instance, but that supervision with proper advice is essential if the malocclusion is to be controlled and a satisfactory occlusion developed for the individual.

Because fluoridation can do so much to reduce caries and the loss of teeth resulting from caries, it is anticipated that the procedure will prove to be another method of reducing malocclusion in children. Scientists in dentistry, medicine, and public health have urged fluoridation to reduce the incidence of caries. By preventing caries it will be effective in maintaining arch length and size which is a prime factor in permitting permanent teeth to erupt into an arch not collapsed by extracted or carious teeth. "Growth undoubtedly has an important role in the successful outcome of . . . cases. . . ." stated Wylie,[10] who also said that in patients exhibiting deficient growth of bone . . . he [Tweed] shares my opinion that it is within the capability of orthodontists in some, if not all, cases to elicit a natural growth response in the mandible which would not have come about except through orthodontic intervention.

By coinciding treatment procedures with growth cycles, most orthodontists believe the maximum in results is achieved with a minimum of harm to teeth and supporting tissues.

SUMMARY

1. An orthodontist is successful because of his capable handling of orthodontic problems, not because of the appliances he uses.

2. Appliances are a means of implementing the prescribed treatment.

3. General dentists are key persons in the detection and correction of orthodontic conditions. They are the first to detect deviations from the normal, to treat incipient malocclusions, and to refer to the specialist patients needing major orthodontic correction.

4. The simplicity or complexity of the orthodontic condition should determine the type of appliance to use.

5. Increased demands for orthodontic care can be met partially by early and accurate diagnosis and by using the simplest appliances which require a minimum of chair time.

6. Fluoridation can reduce malocclusion by reducing caries and caries-caused extractions with their sequelae.

7. Coordinating orthodontic therapy with major growth cycles helps to achieve the maximum results in treatment.

914 Security Bank Building

8. Brandhorst, O. W. Will orthodontics become a part of contemplated government health programs for children? J. D. Educ. 10:138 Feb. 1946.

9. McCall, J. Oppie. Study of malocclusion in preschool and school children. D. Items Interest 66:131 Feb. 1944.

10. Wylie, W. L. Mandibular incisor—its role in facial esthetics. Angle Orthodont. 25:32 Jan. 1955.

Effect of topically applied stannous chlorofluoride on the dental caries experience in children
II. Results two years after initial treatment

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In a previous report[1] which presented the effect of topically applied stannous chlorofluoride at the end of a one year period after the initial treatment, it was shown that stannous chlorofluoride was approximately 85 per cent more effective than sodium fluoride in reducing the dental caries experience in children. One of the more important variables concerning the utility of topical fluoride therapy is the length of time the effectiveness is maintained. Thus, it was of interest to determine to what extent the effectiveness of stannous chlorofluoride remained after a two year period.

PROCEDURE

The experimental procedures for the conduct of this study—which did not contain a control group—have been reported previously.[1] Two years after the initial series of four treatments, the children were re-examined by the same dentist who performed the initial series of examinations (C.L.H.).

RESULTS

The anticariogenic effectiveness of the topical fluoride treatments is shown in Table 1, and a breakdown of the age and sex of the subjects completing the study is found in Table 2. The data in Table 1 indicate the percentage reduction produced by the stannous chlorofluoride when compared to the effectiveness of the sodium fluoride treatments. No absolute reductions can be presented because of the absence of a control group in this study.

These data indicate that the stannous chlorofluoride was 33 per cent more effective after two years than was sodium fluoride as evidenced by the DMF tooth index. This difference is highly significant. The best estimate of the effectiveness of stannous chlorofluoride is found in the data in the last column of Table 1 under total DMF surfaces, which indicate a superiority of stannous chlorofluoride over sodium fluoride of 23 per cent; this difference is highly significant.

DISCUSSION

These data would seem to justify the statement that stannous chlorofluoride is

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1. Howell, C. L., and Muhler, J. C. Effect of topically applied stannous chlorofluoride on dental caries experience in children. Science 120:316 Aug. 20, 1954.

Table 1 • Comparison between topically applied stannous chlorofluoride and sodium fluoride on the dental caries reduction in children two years after the initial series of treatments

Group	No. of Subjects	Av. DMF teeth	Total DMF surfaces
Stannous chlorofluoride	357	1.22	2.74
Sodium fluoride	363	1.82	3.58
Standard error of difference		1.81	3.30
Probability		0.0003	0.003
% reduction in caries rate		33	23

more effective than sodium fluoride as judged by caries increments during the two years after topical application of these compounds to the erupted teeth of children. This conclusion is interesting in light of a previous report[2] which demonstrated the superiority of stannous fluoride over sodium fluoride when applied topically to children's teeth. It thus would appear, as evidenced by two separate clinical tests, that the presence of the stannous ion confers additional anticariogenic properties on the fluoride compound.

A comparison of the two-year data with the results obtained one year after treatment is presented in Table 3. It is clear that caries rates during the second year were quite similar for the two groups, but the absolute difference in increments that was seen at the end of the first year did persist.

In the clinical examination of these subjects, some lesions were diagnosed as "questionable" when no satisfactory decision could be made as to the presence or absence of caries. Subsequently, these questionable lesions were considered sound surfaces for purposes of calculation of the results, and the reported findings are based on the use of this procedure.

It was of interest to determine how the results would have been affected if all questionable lesions had been considered carious instead of noncarious. The two-year results were not altered by recalculation on this basis, but the rather pronounced effect on the one year values is shown in Table 4. This contrast suggests that the examiner should complete the diagnosis at the time of the examination by demanding of himself in every instance a final decision of "carious" or "noncarious". It appears that the use of a "questionable" category for certain conditions omits this decision at the only time when it can be made properly, that is, during the clinical examination. A recent publication[3] also does not recommend the use of a special classification for "questionable" lesions.

Slack[4] reported a 36 per cent reduction in the incidence of dental caries in children one year after the topical application of a 2 per cent stannous fluoride solution. This report is of interest in that this effect was produced even though a half-mouth technic was used in applying the fluoride solution. Such a procedure is to be discouraged when solutions contain-

Table 2 • Age and sex of subjects completing two year study

Age in years	SnClF			NaF		
	Boys	Girls	Total	Boys	Girls	Total
6		1	1	2	2	4
7	24	15	39	22	21	43
8	43	27	70	27	33	60
9	30	27	57	33	28	61
10	34	30	64	28	32	60
11	30	28	58	29	35	64
12	28	24	52	19	28	47
13	9	4	13	12	9	21
14	3		3	1	1	2
15				1		1
Total	201	156	357	174	189	363

2. Howell, C. L., and others. Effect of topically applied stannous fluoride on dental caries experience in children. J.A.D.A. 50:14 Jan. 1955.

3. American Dental Association. Clinical testing of dental caries preventives; report of a conference to develop uniform standards and procedures in clinical studies, by Council on Dental Therapeutics, Council on Dental Research, Council on Dental Health. Chicago, American Dental Association, 1955.

4. Slack, G. L. Effect of topical application of stannous fluoride solution in the prevention of dental caries. (Abst.) J. D. Res. 34:785 Oct. 1955.

Table 3 • Comparison of dental caries increments resulting from the topical treatment of stannous chlorofluoride and sodium fluoride after one and two years

No. of years	Group	No. of subjects	DMF teeth increment	DMF surfaces increment*
One	NaF	397	0.62	1.39
	SnClF	394	0.08	0.56
	% superiority		87	60
Two	NaF	363	1.82	3.58
	SnClF	357	1.22	2.74
	% superiority		33	23

*In the paper presenting the results after one year, the surface increments were actually based on newly decayed, missing, or filled surfaces in previously carious teeth, rather than on previously noncarious teeth, as reported. The DMF surface data in Table 3 are based on all teeth, as are those in the other tables in this paper.

Table 4 • Comparison between the dental caries increments one year after topical treatment with either stannous chlorofluoride or sodium fluoride when the questionable lesions were classed as noncarious or carious

Classification of questionable lesions	Group	DMF teeth increment	DMF surfaces increment
Noncarious	NaF	0.62	1.39
	SnClF	0.08	0.56
	% superiority	87	60
Carious	NaF	0.82	1.55
	SnClF	0.36	0.90
	% superiority	55	42

ing a stannous salt are used because of the fact that the stannous ion has such a pronounced affinity for the enamel surface even when present in micro concentrations. Studies performed at Indiana University in which electron micrographs of the enamel surface were made of teeth from untreated tooth quadrants before and after half-mouth applications definitely suggest a transfer of the stannous ion to the untreated tooth. It would seem only reasonable to suggest that in no instance should such a half-mouth technic be used until it could be proved beyond any reasonable doubt that there was no effect of the treatment solution on the teeth of the untreated quadrants.

SUMMARY

Two years after the initial topical treatment of children's teeth, stannous chlorofluoride was significantly more effective than sodium fluoride in reducing dental caries. When the differences were determined by the DMF tooth index, the superiority of stannous fluoride was 33 per cent, and by the DMF surface index the superiority was 23 per cent. Both of these differences are highly significant.

An effect on caries reduction values (at the end of the first year) was shown when the questionable lesions were considered either as noncarious or carious. It is suggested that a decision as to "carious" or "noncarious" must be made regarding every lesion during the time the clinical examination is being performed.

Drudgery • The everyday cares and duties, which men call drudgery, are the weights and counterpoises of the clock of time, giving its pendulum a true vibration, and its hands a regular motion; and when they cease to hang upon the wheels, the pendulum no longer swings, the hands no longer move, and the clock stands still. ***Henry Wadsworth Longfellow.***

A study of dental caries in 1,361 school children in selected areas of the city of Los Angeles

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In 1953 the division of dental health of the California State Department of Public Health was asked to determine whether or not the water supply of the city of Los Angeles contained a sufficient concentration of the fluoride ion to offer protection against dental caries. The concentrations of fluoride ion in the various sources from which the city obtains its water supply range from 0.0 to 0.9 parts per million (ppm).

In order to determine what relative degree of caries protection Los Angeles' children are receiving, the division of dental health in 1955 conducted a study of the dental caries rates of the 9 to 14 year olds. The dental division of Region 9 of the United States Public Health Service and the dental department of the Los Angeles city schools assisted in the study.

The method chosen to determine this degree of protection was that of comparing the DMF rates (average number of decayed, missing and filled permanent teeth per child) of Los Angeles school children with children of similar age in California[1] and in the naturally fluoridated city of Aurora, Ill.[2] It was assumed that the DMF rates obtained from the Aurora study indicate the maximum protection that can be obtained from water-borne fluorides without any undesirable effects.

SELECTION OF STUDY ZONES

The city of Los Angeles obtains its water from multiple sources having various fluoride contents.

The water served in any particular area may be a blend of several sources, and the amount each source contributes to the blend may be subject to seasonal variation. In addition, some areas have local wells that supplement the main supply when the water demand is heavy.

The selection of a study zone was determined by two factors, (1) a history of a uniform fluoride concentration for at least ten years and (2) an adequate school age population within the zone. A zone that had a reasonably constant fluoride concentration for at least ten

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1. State of California, Department of Public Health, division of dental health records.

2. Arnold, F. A.; Dean, H. T., and Knutson, J. W. Effect of fluoridated public water supplies on dental caries prevalence. Pub. Health Rep. 68:141 Feb. 1953.

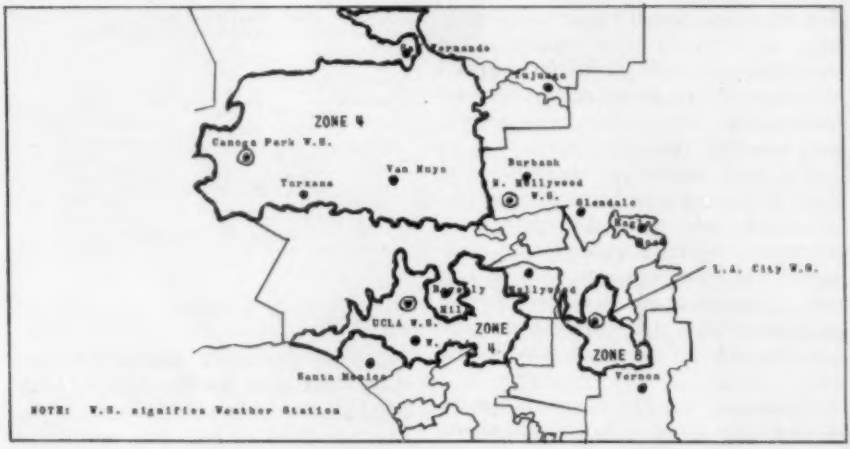

Fig. 1 • Zones selected for dental caries study, Los Angeles, 1955

years was considered as having an adequate water history.

The Los Angeles Department of Water and Power divided the city into 23 zones and prepared a water history for each zone.[3] The histories were examined carefully, and a zone was excluded if the blending of sources, seasonal variation in pumping, or intermittent use of local wells caused fluctuations in fluoride concentration, thus making an average fluoride concentration undeterminable.

Three zones were determined to have a reasonably uniform fluoride concentration. Of these, only two had a resident child population large enough to make a study practicable. The sections of the city included in the two zones selected for study are indicated in Figure 1.

The area designated as Zone 4 includes the major portion of the San Fernando Valley (excluding Pacoima, Sunland, North Hollywood and the city of San Fernando), West Los Angeles, the Wilshire district and portions of the southwest part of the city, such as Westchester and Century Heights.

The section designated as Zone 8 comprises most of the southwest section of downtown Los Angeles.

CHARACTERISTICS OF THE STUDY ZONES

Fluoride Ion Concentration • Zone 4 for the past 15 years has received its entire water supply from a single source—the Owens Valley Aqueduct. Since 1949 the water served in Zone 8 has been a blend of two sources, the River Supply Conduit and the Owens Valley Aqueduct.

The average annual fluoride ion concentrations for both zones are shown in Table 1.[3] The data pertinent to Zone 4 cover a 14 year period. Data on fluoride ion concentrations for Zone 8 prior to 1945 are not available but the Department of Water and Power of the city of Los Angeles feels that the analyses in this zone for the year 1945-1946 are typical of previous years.

The total number of observations in Zone 4 for the 14 year period was 168.

3. Derby, Ray L., principle sanitary engineer, Department of Water and Power, Los Angeles. Personal communication.

The range was from 0.4 ppm (seven readings) to 0.9 ppm (one reading). The most common reading was 0.60 ppm and this accounted for 46 per cent of the total observations. The 14 year mean for the zone was 0.65 ppm.

The total number of observations in Zone 8 for a ten year period was 121. The range was from 0.20 ppm (two readings) to 0.70 ppm (four readings). The most common reading was 0.40 ppm, and this acounted for 66 per cent of the total observations. The ten year mean for the zone was 0.43 ppm.

Temperature • A previous study has indicated that mean annual temperatures may have an important bearing on the ingestion of water-borne fluorides, and consequently on the dental caries rates and fluorosis patterns that may be found in an area.[4] Temperature data were therefore obtained from four weather stations, three within the zones and one less than a mile outside one of the zones. The locations of the weather stations are shown in Figure 1.

The yearly mean annual temperatures from the four readings sites for the period 1952-1955 are shown in Table 2.[5-8] The mean annual temperatures shown were calculated from the average of the high and low temperature for each day of the year indicated. There appears to be no noticeable difference in temperature between the two zones.

Table 1 • Mean annual fluoride concentrations zones 4 and 8, 1941-1954, Los Angeles dental caries study

Year	Zone		Year	Zone	
	4	8		4	8
1941	0.63	NA	1948	0.69	0.38
1942	0.62	NA	1949	0.63	0.38
1943	0.61	NA	1950	0.64	0.48
1944	0.69	NA	1951	0.58	0.45
1945	0.63	0.38	1952	0.59	0.47
1946	0.72	0.39	1953	0.61	0.49
1947	0.78	0.38	1954	0.60	0.43

NA—Not available.

Table 2 • Mean annual temperatures (°F.) for selected weather stations, Los Angeles County, 1952-55

Year	Weather station			
	Canoga Park	North Hollywood	U.C.L.A.	Los Angeles city
1952	60.5	62.3	61.0	63.6
1953	61.4	63.0	62.0	64.6
1954	61.4	62.7	62.7	64.9
1955	61.8	61.5	61.5	63.7

SELECTION OF STUDY POPULATION

The study population was selected from those children in the Los Angeles public schools between 9 and 14 years of age who had lived all their lives in the zone in which they now resided. Children who had been away from the zone for a period of more than 90 consecutive days, or who gave a history of consuming bottled water, were eliminated from the study. Since only permanent teeth were to be examined, a practical lower age limit was set at nine years. The upper age limit was determined by the length, in years, of the water history of the study zones. No constant or determinable fluoride history exceeded a 15 year period.

A questionnaire was used to obtain data from the children. The questionnaire related to previous residences of the child and history of drinking fluoridated water.

There were approximately 34,000 school children in the two zones between the ages of 9 and 14. Of these, 53 per cent were born in Los Angeles County as determined by preliminary screening

4. Galagan, D. J., and Lamson, G. G. Climate and endemic dental fluorosis. Public Health Rep. 68:497 May 1953.

5. U. S. Department of Commerce, Weather Bureau, Climatological Data—California Annual Summary, 1952, Vol. LVI, no. 13.

6. U. S. Department of Commerce, Weather Bureau, Climatological Data—California Annual Summary, 1953, Vol. LVII, no. 13.

7. U. S. Department of Commerce, Weather Bureau, Climatological Data—California Annual Summary, 1954, Vol. LVIII, no. 13.

8. U. S. Department of Commerce, Weather Bureau, Climatological Data—California Annual Summary, 1955, Vol. LIX, no. 13.

Table 3 • Sample selection data. * Los Angeles dental caries study, 1955

	Number	Per cent
Pupils in classrooms	33,524	100.0
Pupils given questionnaire	17,740	52.9
Pupils returning questionnaire	11,986	35.8
Pupils eligible for dental inspection	1,548	4.6
Pupils inspected	1,315	3.9

*Data not available for three schools.

by classroom teachers. Approximately 18,000 children were given questionnaires for completion by their parents. Further eliminations, resulting in reductions in the sample size, are summarzed in Table 3.

CHARACTERISTICS OF STUDY POPULATION

The age and sex distribution of the 1,361 children examined is shown in Table 4. This table includes data from the three schools which are omitted from Table 3.

The sample size of Zone 8 is small, especially in the 12, 13, and 14 year old children. The sex distribution was also unequal in some ages, notably in Zone 8 in the 10, 11, 13 and 14 year old children. Since there is some evidence of slightly higher DMF rates in girls of these ages,[9] the unequal distribution may affect the value of comparisons between the zones to some extent.

In choosing the sample, race was not taken into consideration, and in examining the children race was not noted. No attempt was made to classify the children by economic status. Zone 4 is extremely large, however, and is representative of all economic groups, whereas Zone 8 is composed primarily of lower economic groups.

EXAMINATION PROCEDURES

All examinations were done under artificial light with a no. 4 plane mouth mirror and a no. 21 single ended explorer. New mirrors and explorers were used in the study.

The criteria for the diagnosis of a DMF tooth used in the study follow:

1. Normal: Any tooth erupted and present without filling or caries.

2. Decayed: Any tooth with a pit, fissure or cavity which caught a sharp explorer; any tooth with recurrent decay around a filling; temporary fillings (cement). A tooth both filled and decayed.

3. Filled: Any tooth with a metal, silicate, or plastic filling and having no evidence of decay.

4. Missing: Any permanent tooth which has been extracted; any tooth indicated for extraction; that is, any tooth which could not be restored by filling.

Examiners worked in teams of two and were rotated so as to work in all possible combinations and each examiner equally in all zones.

FINDINGS AND DISCUSSION

Dental Caries • Age specific DMF rates were calculated for the two zones (Table 5). In all six ages, Zone 4 with .65 ppm

9. Knutson, J. W.; Klein, Henry, and Palmer, Carroll E. Studies on dental caries. VIII Relative incidence of caries in the different permanent teeth. J.A.D.A. & D. Cosmos 25:1923 Dec. 1938.

Table 4 • Number of children by sex and age, zones 4 and 8, Los Angeles dental caries study, 1955

Sex and age	Zone 4	Zone 8	Sex and age	Zone 4	Zone 8
Total all ages	1,218	143	12 years	241	14
boys	607	78	boys	114	7
girls	611	65	girls	127	7
9 years	270	44	13 years	158	13
boys	140	23	boys	88	9
girls	130	21	girls	70	4
10 years	212	31	14 years	106	11
boys	97	20	boys	51	10
girls	115	11	girls	55	1
11 years	231	30			
boys	117	9			
girls	114	21			

Table 5 • Average number of decayed, missing, and filled permanent teeth, F-ratio, and per cent of children with all normal permanent teeth, zones 4 and 8, Los Angeles dental caries study, 1955

Dental condition	Age (last birthday) and zone											
	9 years		10 years		11 years		12 years		13 years		14 years	
	4	8	4	8	4	8	4	8	4	8	4	8
Av. no. DMF teeth per child	1.87	2.38	2.27	2.87	3.05	3.79	3.96	5.00	4.60	7.08	5.64	7.36
Av. no. D teeth per child	.99	1.89	1.18	1.94	1.58	2.55	2.15	4.21	2.31	6.38	2.62	5.64
Av. no. M teeth per child	.03	.02	.01	.29	.03	.38	.05	.36	.04	.46	.08	.55
Av. no. F teeth per child	.84	.47	1.08	.65	1.43	.86	1.76	.43	2.25	.23	7.94	1.18
F-ratio*	45.0	19.6	47.4	22.5	47.0	22.7	44.4	8.6	49.0	3.3	52.2	16.1
Per cent children with all normal permanent teeth	30.4	11.1	23.1	12.9	18.6	10.3	12.9	14.3	13.8	15.4	10.4	0.0

*$\frac{\text{F teeth}}{\text{DMF teeth}} \times 100$

had a lower DMF rate than Zone 8 with .43 ppm. The rates ranged from 1.87 to 5.64 in Zone 4 (9 and 14 year olds respectively) and from 2.38 to 7.36 in Zone 8 (9 and 14 year olds respectively). The least difference in DMF rates between the two zones was in the nine year old children (where it was .51 DMF teeth.) The greatest difference was in the 13 year old children (2.48 DMF teeth). It should be noted, however, that the sample size in some ages in Zone 8 is small, particularly in the 12, 13 and 14 year old children, and therefore comparisons should be made with caution. This also may well account for the percentage of children with all normal permanent teeth being higher in Zone 8 for 12 and 13 year old children. The reverse is true for the other four ages (Table 5).

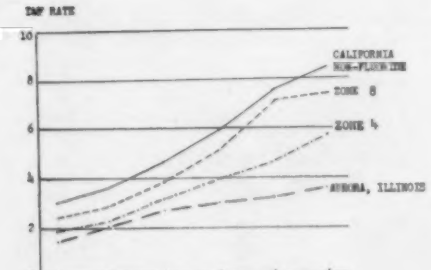

Fig. 2 • DMF rates for Zones 4 and 8 and selected areas, Los Angeles dental caries study, 1955

The dental health care pattern is also noticeably different in the two zones. This can be discerned by examining the average number of F teeth in relation to the average DMF, expressed in percentage terms. This appears as the F ratio in Table 5. Some differences were to be expected because of the different economic levels of the zones. Even in the age group with the least difference in the F ratio, the 11 year old children, the ratio is over twice as high in Zone 4 as in Zone 8. Using the average number of missing teeth per child as another index of care, there is further indication that Zone 4 is superior in this respect to Zone 8. In all age groups except the nine year old children, Zone 8 has a higher average in M teeth than Zone 4.

In order to evaluate the effect of the fluoride concentration on DMF rates in these zones, a comparison of Zones 4 and 8 was made with a fluoride and nonfluoride area. The areas chosen for comparison were Aurora, Ill., with a fluoride content of 1.2 ppm, and 13 nonfluoride cities in California (Alameda City, Antioch, Healdsburg, Hollister, Livermore, Morgan Hill, Oroville, Palo Alto, Pleasanton, Sacramento, San Diego, San Fran-

Table 6 • DMF rates for zones 4 and 8 and selected areas, Los Angeles dental caries study, 1955

Age	Zone 4	Zone 8	Aurora Ill.	California nonfluoride
9	1.87	2.38	1.52	2.96
10	2.27	2.87	2.02	3.67
11	3.05	3.79	2.67	4.66
12	3.96	5.00	2.95	5.92
13	4.60	7.08	3.09	7.42
14	5.64	7.36	3.64	8.45

cisco and St. Helena). Comparisons were made before these towns adjusted the fluoride levels of their water supplies.

Screening for residency was done in Aurora. It was not done in the California nonfluoride cities. It can be assumed that if it were done, these cities would probably have a higher DMF rate, since some of those persons not native to the area may formerly have lived in a region having adequate fluorides in their water supplies.

The DMF rates for the California cities, Aurora, and Zones 4 and 8 appear in Figure 2 and Table 6. As can be seen, the California nonfluoride cities have consistently higher rates than Zones 4 and 8, and Aurora has consistently lower rates than Zones 4 and 8.

The actual differences in these DMF rates are given in Table 7. A plus sign indicates that the DMF rates in Zones 4 and 8 are higher than those of the area with which they are being compared, and a minus sign indicates that DMF rates in Zones 4 and 8 are lower than those of the areas with which they are being compared. For example, comparing the nine year old children in Zone 4 with those in nonfluoride areas, there is a difference of 1.09 DMF teeth. As another example, there is a difference of 3.72 DMF teeth between 14 year old children in Zone 8 and Aurora. The plus indicates Zone 8 has a higher DMF rate than Aurora by 3.72 DMF teeth.

Fluorosis • In addition to examining the children for dental caries, an examination for dental fluorosis was done to determine whether or not there was any objectionable fluorosis. None was observed.

SUMMARY

A study of the dental caries rates of 1,315 Los Angeles school children was conducted by the division of dental health of the California State Department of Public Health; dental division of Region 9, U.S. Public Health Service, and the dental department of the Los Angeles city schools.

The study was carried out on children 9 to 14 years of age who had lived all their lives in one of two study zones, each of which had a constant and determinable fluoride concentration. The fluoride

Table 7 • Differences in DMF rates between zones 4 and 8 and selected areas

Zone 4			Zone 8		
Age in years	Aurora Ill.	California nonfluoride	Age in years	Aurora Ill.	California nonfluoride
9	+ .35*	−1.09†	9	+ .86*	− .58†
10	+ .25	−1.40	10	+ .85	− .80
11	+ .38	−1.61	11	+1.12	− .87
12	+1.01	−1.96	12	+2.05	− .92
13	+1.51	−2.82	13	+3.99	− .34
14	+2.00	−2.81	14	+3.72	−1.09

*Plus sign indicates that DMF rates in Zone 4 or 8 are higher than those of the area with which they are being compared.
†Minus sign indicates that DMF rates in Zone 4 or 8 are lower than those of the area with which they are being compared.

concentrations of the two zones were .65 ppm and .43 ppm. The differences in mean annual temperatures between the study zones were slight. One zone was quite large in area and encompassed a number of economic levels, whereas the other was smaller and of a generally low economic level.

The DMF rates of the .65 zone were lower in all age groups than those of the .43 zone. In the zone with the higher economic level (.65), the level of care, as measured by the F ratio, was greater. The DMF rates of both zones were lower than those of comparable groups in nonfluoride cities in California, and higher than the rates of Aurora, Ill. (1.2 ppm), indicating that although there are some benefits from the present fluoride concentration of the water in the area surveyed in Los Angeles, those benefits are less than optimum. In other areas in the city where the fluoride concentration is less than the two areas surveyed, the benefits from adjusting the concentration to the optimum would be even greater.

The retention of complete dentures

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Retention, in prosthetic dentistry, is a force which resists displacement of a denture in an occlusal direction. Its presence contributes greatly to the comfort and confidence of the wearer of complete dentures. The magnitude of this force is described conventionally as being dependent on: (1) forces of adhesion and cohesion; (2) atmospheric pressure; (3) the use of undercuts; (4) muscular action, and (5) in lower dentures, the weight of the denture.

The third of these factors finds limited application and can be used only where the undercut is unilateral, or where the bulbous ridge formation is due to a soft tissue hyperplasia rather than to the bony form of the alveolar ridge. These conditions are seen much less frequently than is the bilateral undercut where the bone is covered by a thin or medium thin layer of soft tissue of low compressibility.

The fourth factor, muscular action, comes into effect only after a significant time interval. A pattern of muscle action must be developed at the reflex level which contrives to retain rather than to displace the appliance. The writings of Fish[1] and Lee[2] on the development of correctly shaped polished surfaces are major contributions to an understanding of this factor. The importance of positive action of the facial and oral musculature in retaining complete dentures should not be overlooked. The weight of the lower denture influences its potentiality for retention. The patient changing from a vulcanite to an acrylic lower denture often experiences difficulty as a result of

1. Fish, E. W. Principles of full denture prosthesis, ed. 5. London, Staples Press, 1952.
2. Lee, J. H. Form of the denture surfaces. D. Record 74:318 Nov. 1954.

the decreased density of the newer material.

This paper, however, is concerned primarily with the forces of adhesion, cohesion and atmospheric pressure. Its object is to analyze the factors which govern the magnitude of the retentive forces normally developed immediately on insertion of the dentures.

Two important bodies of work have contributed to the fundamental knowledge in this field. The first is research carried out in the department of physics of Northwestern University Dental School under the direction of Eugene W. Skinner. Early experiments were carried out by Östlund[3] and Chung[4] on a model of an upper jaw, constructed to simulate as closely as possible the condition *in vivo*. A metal model was covered by a resilient layer of plastic material for which denture baseplates of different specifications, and made from different kinds of impressions, were fabricated. The magnitude of the force required to effect displacement of these bases was measured. Later, Skinner, Campbell and Chung[5] carried out similar experiments in the mouth of a patient.

The second body of work consists essentially of an analysis of the physical forces concerned in the development of retention. The soundest treatment in this field is by Stanitz.[6] His particular contribution concerns the manner in which the forces of adhesion, surface tension and atmospheric pressure contribute to the complex of retention. At the salivary meniscus the force of adhesion, acting between unlike molecules, finds effect between the saliva and the mucosa, and between the saliva and the denture base; the cohesive property of the saliva, or its surface tension, transmits this force over the free salivary interface, and accounts for the drop in pressure in the salivary film between denture and supporting mucosa, to a value below atmospheric pressure. The product of the difference between atmospheric pressure acting at the salivary meniscus and the reduced pressure in the salivary film and the projected area of the denture, constitutes the force of retention. Stanitz' analysis assumes a static state in the fluid film: this point cannot be considered proved.

The results of these researches demonstrate that in order to develop a retention of high magnitude, the following two conditions must be secured: (1) the development of a completely encompassing salivary meniscus of extremely thin dimension between the denture base and the oral tissue, and (2) the development of an intact salivary film between the fitting surface of the denture and the supporting mucosa. The presence of air in this film reduces the potentiality to secure a well-retained denture.

SALIVARY MENISCUS

Stanitz has calculated that it is only when the thickness of the meniscus is of the order of 0.0005 inch or less that a highly retentive force can be developed between two glass plates with an intervening water film utilizing the fundamental forces of cohesion, adhesion and atmospheric pressure. It seems logical to assume that such an order of film dimension would be necessary to secure a good retention in a complete denture. Further, this dimension of meniscus must be present as a continuous interface which completely encircles the denture; local increases in its thickness lead to a large decrease in the resulting retention.

In practice the fit of a denture base is seldom sufficiently accurate to give such a close approximation of the denture to

3. Östlund, S. L. G. Some principles in the retention of dentures. Northwestern Univ. Bul. 49:11 Nov. 1948.

4. Skinner, E. W., and Chung, Paul. Effect of surface contact in the retention of a denture. J. Pros. Den. 1:229 May 1951.

5. Skinner, E. W.; Campbell, R. L., and Chung, Paul. Clinical study of the forces required to dislodge maxillary denture bases of various designs. J.A.D.A. 47:671 Dec. 1953.

6. Stanitz, J. D. Analysis of the part played by the fluid film in denture retention. J.A.D.A. 37:168 Aug. 1948.

the oral tissues. Dimensional changes occur in taking the impression, in casting the model, and in fabricating the denture base; the last-mentioned stage is responsible for the greatest discrepancy, especially when acrylic resin is the material selected.

Thus, practically, it is essential that soft tissue be put under slight compressive stress in the elastic range, so that it exerts a small pressure in the direction of the denture base; this condition assures the thin meniscus. Clinically, this fact has been realized for many years and the development of a "peripheral seal" on a denture has been advocated by many operators as a means of securing a "positive retention." What has not been so widely recognized is that the salivary meniscus lies at the denture periphery only in some situations.

For the greater part of its length the meniscus is situated between the tissues of the lip and cheek on the one hand, and the labial and buccal facing of the denture on the other. In the lower denture posteriorly the tongue relates continuously to the lingual surface of the denture and the meniscus is accordingly positioned on the lingual polished surface of the denture rather than at the periphery.

Therefore it becomes necessary to discriminate two meniscal positions, the one acting on the polished surface of the denture and the other on the periphery; accordingly it is convenient to talk of a facial and a peripheral seal.

A facial seal acts when a more or less vertical soft tissue surface proximates an equivalently shaped polished surface of the denture. Thus in the upper denture a facial seal acts labially and buccally, and in the lower denture, in addition to a labial and buccal facial seal, a posterior lingual facial seal is present. Since no such vertical tissue wall is present at the posterior border of the upper denture the seal necessarily is peripheral and for this reason a post-dam is developed routinely in this situation.

In the lower denture a peripheral seal is necessary in the retromolar region and in the anterior lingual region. In this latter situation, the peripheral seal is not effective continuously since in the normal rest position the tongue lies against the polished surface of the denture.[7] When the mouth is opened, however, the tongue drops back to shut off the oropharyngeal isthmus, and the meniscal position accordingly becomes peripheral.

In order to effect a seal it is axiomatic that an elastic soft tissue layer must be present. In the lip and cheek tissues this is present in varying degree, depending on personal characteristics, location and age. Some patients naturally have an abundance of areolar tissue between the lip and cheek mucosa and the muscle layer; in others, this tissue is present to a lesser extent. The thickness of this layer depends, too, on its location. In the bicuspid and cuspid regions there is a relatively thin soft tissue layer covering the levator and depressor anguli oris muscles, whereas more posteriorly its thickness increases in relation to the buccinator muscle. In a young person this layer is thicker than in an older person who shows senile atrophy.[8] Similarly, the post-dam on the upper denture should lie over resilient soft tissue and should, therefore, cover the soft, rather than the hard, palate. Finally, if a complete lower denture is to be sealed, soft tissue must be present in the retromolar region and at the reflection of the floor of the mouth anteriorly.

Generally, a facial seal is preferable to a peripheral seal since a small movement of the tissue surface in relation to the denture facing is permissible, without there being a change in film thickness at the interface. Further, the employment of

7. McKee, T. L. A cephalometric radiographic study of tongue position in individuals with cleft palate deformities. Thesis. Northwestern University Dental School, 1955.

8. Lammie, G. A. Some factors affecting the full lower dentures. Fort. Rev. Chicago D. Soc. 32:7 July 1, 1956.

a facial seal does not demand such an exacting impression technic as do some of the methods described for obtaining peripheral seal.

Whereas a seal involves some slight elastic compression, it is imperative that the components of the denture do not enter the zone of action of the oral muscles. Frequently the tonus of these muscles, and certainly their contraction, eventually will lead to the displacement of the denture regardless of the magnitude of the retentive force achieved. This effect is seen in the upper denture in the anterior segment. Especially important in this connection is the levator anguli oris muscle. All the radial muscles inserting into the lip and the orbicularis oris, however, have a similar effect. It is seldom that trouble is encountered posteriorly in the buccal segment as the plane of the buccinator diverges from the median line inferiorly and is covered, as already pointed out, by an areolar tissue of substantial thickness. At the posterior border in the region of the post-dam the musculature may be a complication.

In some patients, especially those having an ovoid hard palate, there is an immobile region of significant anteroposterior dimension between the posterior border of the denture and the mobile region of the soft palate; here the denture base may be extended well back onto the soft palate, when compression is effected over a region. In other soft palates, particularly where the hard palate has a V-shaped coronal section, the movement axis of the soft palate corresponds exactly with the termination of the hard palate. Here it becomes a critical matter to place a thin post-dam over soft tissue so that it does not enter the moving zone of the soft palate.

In the lower denture the thickness of the labial and buccal facings of the denture generally should be thin in the bicuspid, cuspid and incisor regions. This feature avoids displacing the depressor anguli oris and the depressor labii inferioris muscles. The extension is especially important in the anterior segment as it is a common fault to enter the zone of action of the superficial mentalis muscle with an overextended denture periphery. It must also be ascertained that extension of the retromolar edge of the denture does not interfere with the action of the anterior margin of the strong masseter muscle. Lingually, and in the midline, overcompression would deflect the fibers of the genioglossus muscle, and this must be avoided. Similarly, at the posterolingual corner of the denture, freedom must be given to the mylohyoid and palatoglossus muscles.

Three types of soft tissue may be seen in various locations where an elastic quality is not present in a pronounced degree. The first is senile atrophy, where the mucosa and submucosa are both involved. There is a reduction in surface area and a change in the elastic fiber structure of the mucosa, which combine to reduce the elastic quality of this tissue. The submucosa is reduced in depth; thus, the amount of extracellular tissue fluid which can be directed temporarily into other tissue planes is also reduced. Accordingly the same potentiality no longer exists to compress the tissue elastically. Different regions suffer from the effect of this change in different measure. It is noted most in the lower lingual region in the midline, where a thin atrophic mucosa and submucosa overlie the superior genial tubercles.

The second type of tissue which causes difficulty is edematous, and, practically speaking, is seen only in the soft palate. Here a chronic inflammatory reaction is sometimes present, the process having extended from adjoining tissues. This mucosa is thin and appears injected. A great deal of extracellular fluid appears to be present and suggests that such a tissue might well be highly elastic. Unfortunately, although this tissue can be compressed readily, it does not tend to regain its old form immediately. Such a

tissue is found clinically to be ineffective in maintaining a thin peripheral salivary film. Nor is a heavy post-dam the solution in such instances, as this tissue is particularly prone to acute inflammatory reaction and ulceration.

The third type of tissue which does not permit elastic compression is genetic in origin and is confined to the lower retromolar region. Sometimes the retromolar pad has a considerable depth of submucous tissue, but at other times the mucosa is tightly bound to the periosteum. If a resilient soft tissue is not present in this region, it is not possible to be assured of a sufficiently thin meniscus.

Thus in practice a sufficiently thin salivary meniscus to secure a positive retention in a complete denture generally can be obtained with present materials and technics only by slight elastic compression of the soft tissues in relation to the denture, either on the polished surface or at the periphery of the denture. Although slight compression is necessary, encroachment into the zone of action of the oral and facial muscles must be avoided if good retention is to be secured. In some instances the tissue is inelastic and it then becomes impossible to develop a positive retention; atrophic and edematous tissues fall into this class as does also the congenital absence of resilient tissue.

INTACT SALIVARY FILM

On superficial analysis it would seem a simple matter to ensure an unbroken salivary film between the oral mucosa and the fitting surface of the denture. The accurate molding of a denture base on a model obtained from an impression recording the tissues in their resting form would appear to meet the requirement. Sometimes, however, air inclusions complicate the issue and these may overlie the fitting surface of the denture, or its periphery, in a location where the seal is facial.

An upper denture cannot be constructed with a fitting surface which exactly corresponds to the resting state of the tissues, because of the varying thickness and histologic structure of the soft tissue layer which covers the maxilla, if the load is to be distributed over the whole maxillary bone. If such an upper denture could be constructed, the hard regions of the mouth would bear the greater part of the pressure applied to the denture, and those regions covered by a substantial layer of soft tissue would give little support. Since this condition is undesirable from the viewpoint of comfort and bone preservation, if an impression is taken in a material of low viscosity, the resulting model may require modification by the incorporation of reliefs. These should always be of minimal extension and thickness; decisions on these two criteria should be made only after a thorough palpation of the concerned region.

Reliefs should not be included routinely over the palatine foramen and the incisive fossa; only rarely does the denture have a traumatic effect on the vessels and nerves emerging from these canals. The inclusion of unnecessary relief areas can serve only to reduce the retention through causing air inclusions in the salivary film. In the lower denture it is rarely necessary to include reliefs because of the more uniform quality of the soft tissue which covers the mandibular alveolar ridge.

The second cause of air inclusions in the salivary film between the mucosa and the fitting surface of the denture is the fact that it is impossible to reproduce the exact dimensions of the model in an acrylic denture base. Faulty technic can produce gross distortion of the base and render it unacceptable. Even with the most exacting technic, however, polymerizing and thermal contractions render an exact replica impossible. Some types of dentures are found to suffer from this defect more than others, and the deep

V-shaped palatal vault deserves special mention. Here there is liable to be a space between the mucosa and fitting surface of the base in the midline; air inclusions and consequent reduced retention may be seen in such dentures. The inability of the dentist to reproduce the denture base with absolute accuracy is fortunately compensated for, to some extent, by the potentiality of the soft tissues to conform to the fitting surface of the appliance. This compensation takes place in two ways.

First, when load is transmitted to the occlusal surface of the upper denture the soft tissues are compressed slightly, and by a commensurate change of form, accommodate to the denture surface. They do not immediately regain their resting form, and possibly before a sufficient length of time for their complete recovery of form, another occlusal load has been applied. It must be remembered that swallowing takes place once per minute[9] and that this act is accompanied by a firm occlusion of the upper and lower teeth in centric occlusion. This observation accounts for the increased retention sometimes noted after firm, rather than light, seating pressure is used when inserting a denture. The obliteration of air under firm seating pressure may be observed in a clear acrylic denture base.

Second, after a considerable period of time and particularly if there is a slight replacement of bone by fibrous tissue, the epithelium form comes to duplicate exactly the denture form. In this way the salivary film may become intact and retention is improved. This chain of events is not a constant finding; it requires a little replacement of bone by fibrous tissue without concomitant alveolar resorption.

Air inclusions also occur in the region of the periphery where the seal is on the polished surface of the denture. Undercuts, functional change in mucosal reflection position, and failure to fill the tuberosity space laterally are liable to cause this complication.

It is best to reduce bilateral undercuts surgically prior to starting denture work. There are some patients, however, who will not sanction such measures; with such patients the treatment often recommended is to cut away denture base material from the fitting surface of the denture but not from its periphery until insertion can be accomplished. This reduction necessarily creates an air space between the cut surface of the denture and the alveolar ridge. If this results in inadequate retention, the height of the buccal or labial denture facing may be reduced to the level of the maximum bulge of the ridge. A sharper peripheral border must now be used to allow the cheek mucosa to collapse onto the alveolar wall, thereby obliterating the air.

The potentiality of the oral vestibule to contain the labial and buccal facing of the denture during opening of the mouth, and during movement of the facial muscles, is due to the elastic quality of the bounding tissues. In many patients, when the mouth is opened to the functional position, there is not a significant force at the mucosal reflection and the denture is retained. This is due to the invagination of the buccal mucosa into the oral cavity and to a secondary undulation of this mucosa. When the mouth is opened, this epithelium moves slightly laterally and its surface becomes flatter. When the tissues are atrophied, this potentiality does not exist to the same extent, and, especially when the mouth is opened wide, the sulcus is reduced in depth and the buccal mucosa is applied tightly against the alveolar ridge. In such an instance a considerable force is exerted on the denture periphery and this may displace the denture. Here it is necessary to extend the denture only to the functional sulcus position and to use a sharper periphery

9. Grant, J. C. B. Method of anatomy, descriptive and deductive, ed. 5. Baltimore, Williams & Wilkins Co., 1952.

as already described. This condition precludes the possibility of an air trap existing beneath a wide, well-rounded periphery. The sharper border on the functional sulcus level also is indicated for those patients who engage in facial gesticulation and use forcible, extensive contractions of the facial muscles.

An air inclusion is apt to exist on the buccal facing of the polished surface of the upper denture in the tuberosity region which will prevent the development of maximal retaining force. In every situation other than in the maxillary tuberosity region, the lip and cheek mucosa lie in passive contact with the edentulous alveolar ridge, so that the vestibular space which accommodates the denture facing is only potential. This condition may be seen in the tuberosity region, but the anatomy of the part sometimes makes this a real rather than a potential space. This space must then be filled completely by the denture base if an air inclusion is to be prevented. A positive retention in many instances has been gained without any modification other than the addition of compound to the buccal facing of a poorly retained denture in the tuberosity region.

Finally, where some, or all, of the upper anterior teeth must be butted against the gingiva, air tends to be held in the peripheral region of the denture. An interrupted air inclusion lies above the necks of the teeth, preventing the development of a good seal. The remedy in this instance is to add a short, thin gingival facing in acrylic resin which terminates at the position of maximum contour of the alveolar ridge. With modern acrylic resins natural appearances can be obtained as well as a positive retention, provided that the lip makes contact with the added facing. In patients with short, underdeveloped upper lips this is not possible. Preliminary alveolectomy provides room for a labial facing on the denture.

PRINCIPLE OR TECHNIC

The number of papers which have been written on impression technics is legion. In this paper no reference has been made to technic as the writer wishes to emphasize the prior importance of physical and biologic principles. The choice of technic must depend on the particular denture; there is no universal technic. This choice, however, should be based on fundamental principles. Nor is a knowledge of the forces of retention the only criterion on which a selection of impression technic should be made. A knowledge of the properties of the various impression materials and the particular problems of the patient—for instance, the presence of microstomia, excessive salivation, extensive movement of the facial muscles, and undercuts—influences the final decision. Often alternative technics seem to give equal prospect of success; the technic most familiar to the operator should be the one of choice.

6 Eaton Road

Twilight of Man • If ships from the earth ever set out to conquer other worlds they may find themselves, at the end of their journeys, in the position of painted war-canoes drawing slowly into New York Harbor. *Arthur C. Clarke. Great Winds and Small.*

A soft roentgen-ray study of early carious lesions

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The first clinical manifestation of dental caries is the development of white regions in the enamel. These lesions, which will be termed "white spots," usually turn into cavities but they also may remain unchanged or take on a brownish color. The uncertainties which exist with regard to the changes which occur in these lesions prompted the present study. A method utilizing soft roentgen rays was chosen because recent developments of fine grain emulsion films make it possible to study microstructures in teeth not revealed by previous roentgenographic technics.

Only a brief summary will be given of previous soft roentgen-ray findings on enamel caries because a detailed review of the roentgenographic literature in this field recently has been presented by Bergman and Engfeldt.[1] In a microroentgenographic study in which a method similar to the one utilized in the present study was used, these workers showed beautiful reproductions of structural details of caries in enamel and dentin. From this work and a number of papers by Applebaum and others[2-6] it appears that incipient caries has a lower roentgen-ray absorption than sound enamel. The carious lesions often show radiolucent areas below a highly radiopaque external layer of enamel. Although the striae of Retzius cannot be seen in sound enamel, they frequently are visible within carious lesions where they appear more radiolucent than adjacent enamel.

It may be concluded from the literature that the advance of the carious lesion is influenced both by the external layer of the enamel and by the striae of Retzius. That the striae of Retzius affect the progress of the carious process is also borne out by histologic studies.[7] The present work was designed to determine the microroentgenographic structure of white spots and the effect of initial caries on the surface and subsurface structure of the enamel.

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1. Bergman, Gunnar, and Engfeldt, Bengt. Studies on mineralized dental tissues. II. Microradiography as a method for studying dental tissues and its application to the study of caries. Acta Odont. Scandinavica 12:99 Nov. 1954.

2. Applebaum, Edmund. Incipient dental caries. J.D. Res. 12:619 Aug. 1932.

3. Applebaum, Edmund; Hollander, Franklin, and Bodecker, Charles F. Normal and pathological variations in calcification of teeth as shown by the use of soft x-rays. D. Cosmos 75:1097 Nov. 1933.

4. Applebaum, Edmund. Tissue changes in caries. D. Cosmos 77:931 Oct. 1935.

5. Applebaum, Edmund. Tissue changes in dental caries. J.A.D.A. 25:1223 Aug. 1938.

6. Applebaum, Edmund. Radiopaque surface layer of enamel and caries. J.D. Res. 19:41 Feb. 1940.

7. Sullivan, H. R. Formation of early carious lesions in dental enamel. J.D. Res. 33:218 April 1954.

PROCEDURES

More than 100 teeth from persons of known ages were examined under a binocular microscope. Sections were made of ten teeth which were selected because they had white spots with an apparently intact outer enamel. The teeth were from persons ranging from 9 to 17 years old and the lesions were located in proximal surfaces close to the contact points. Studies also were made of advanced carious lesions and regions of brown pigmentation.

The sections were cut with abrasive disks and ground plano-parallel to a thickness ranging from 50 to 100 microns by means of a Crisp grinding machine.[8,9]

The roentgenograms were obtained on Kodak spectrographic plates no. 649-O, which have an extremely fine grained photographic emulsion. Roentgen-ray exposures were made at a target distance of approximately 15 cm., with a low voltage machine equipped with a General Electric diffraction type tube with a copper target. The machine was operated at 30 kilovolt peak and 10 milliampere tube current. The roentgen rays were transmitted through a beryllium window.

RESULTS

Figure 1,A, shows a microphotograph of the type of lesion studied. In Figure 1,B,C and D, the microroentgenogram of this lesion has been enlarged. It will be noted from Figure 1,A, that the lesion is cone-shaped, and from Figure 1,B, that the external enamel of the lesion appears to be intact, whereas the subsurface enamel shows pronounced radiolucency. Both these figures show that the lesion tends to progress from the contact point in the direction of the enamel rods. The borders of the lesion toward the dentinoenamel junction and the neck have a more irregular pattern. In Figure 1,C, the striae of Retzius are visible as well-defined, radiolucent lines. They seem to increase gradually in thickness in several segments. The striae become invisible close to the surface of the enamel, and as a result the border line zigzags between the apparently normal surface enamel and the radiolucent subsurface enamel.

In the highest magnification of the microroentgenographic image, shown in Figure 1,D, it will be noted that each stria of Retzius is associated with a zone of radiolucency extending outward toward the enamel surface. Frequently the radiolucency extends only into a part of the enamel between two striae whereas the most peripheral part of this enamel appears almost normal. In Figure 1,D, enamel rods also can be seen in many regions. As the rods approach the striae of Retzius they seem to diminish in width. This narrowing of the rods becomes more pronounced with increase in radiolucency, and in locations of severe radiolucency the rods have disappeared.

In all, ten white spots of different sizes were studied and the structural changes Generally, brownish regions had a similar already described were found consistently. roentgenographic appearance. Figure 2, A, shows a microroentgenogram of a brown spot located distobuccally on a maxillary first molar from an 11 year old boy. Under a low-power binocular, the surface of this lesion appeared smooth and shiny except for a few dull spots. Again, it can be seen that the outer enamel is more radiopaque than the subsurface enamel but the radiodensity of the outer enamel varies from place to place suggesting some demineralization.

In Figure 2,B, which shows a higher magnification of the microroentgenogram, the radiolucent regions extend to the surface and break the continuity of the superficial enamel. The enamel rods

8. This machine was made available through the cooperation of R. S. Manly and V. F. Lisanti, Tufts University School of Dental Medicine.

9. Crisp, L. R. Process of preparation of tooth sections for microscopy, PB 111471, U. S. Department of Commerce, Office of Technical Services, Washington, D. C.

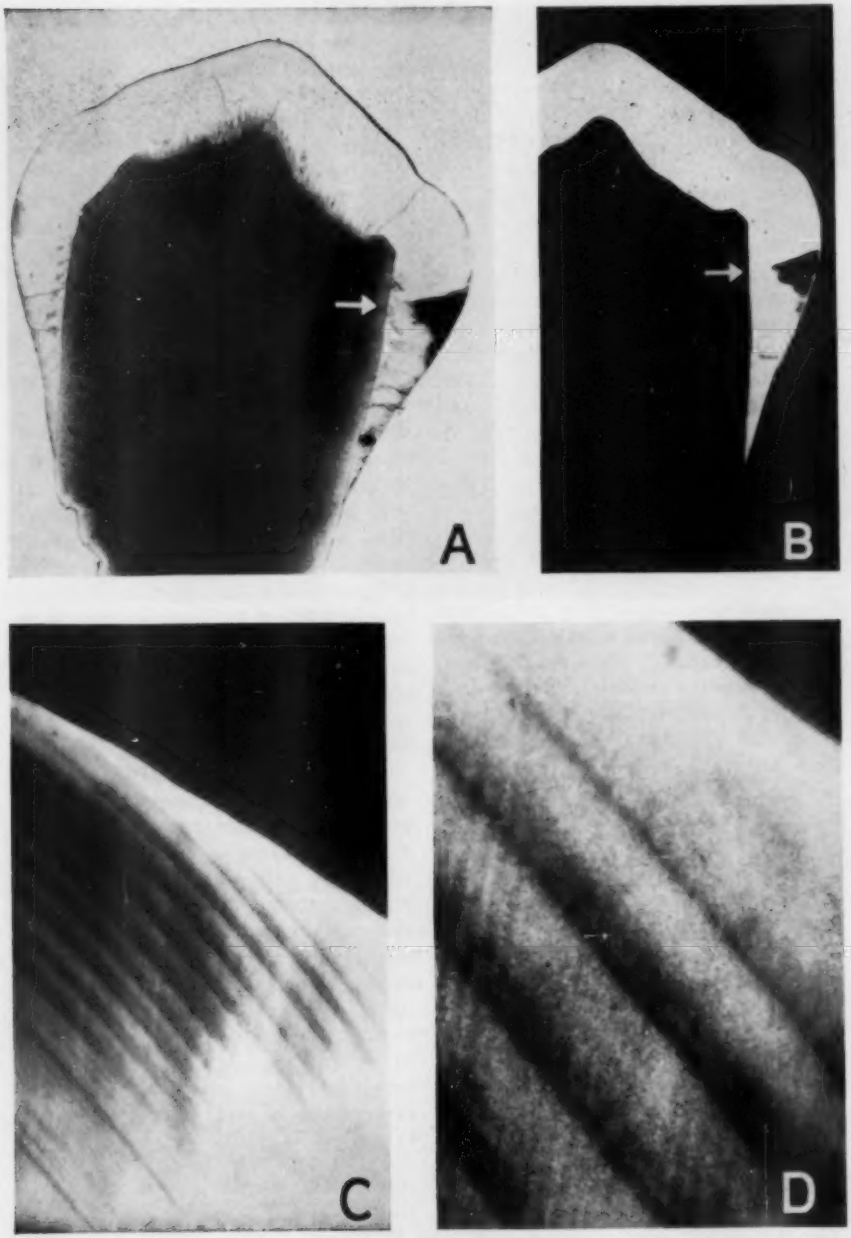

Fig. 1 • A: Microphotograph of white spots, magnification X8. B, C and D: Microroentgenogram of the same lesion, enlarged X8, X100 and X440, respectively

are clearly visible in this part of the lesion and at the surface they appear to extend outward like bristles on a brush. The width of the prisms varies, and in some regions they seem to have disappeared completely. The striae of Retzius cannot be seen in this lesion, possibly because of pronounced decalcification.

Sections of more advanced enamel caries showed roentgenographic changes similar to those described, except that various amounts of the outer enamel had been lost. In some of these sections the microroentgenograms showed a detectable calcific layer of external enamel undermined at the margin of the cavity and with no visible underlying structure to support it. These remnants of surface enamel had a radiodensity similar to that of the neighboring sound enamel.

DISCUSSION

The white spots included in the present study were considered to be early carious lesions rather than developmental defects, for the following reasons: (1) the lesions were all located in caries susceptible regions, and (2) the affected teeth were from persons in the highly caries-active age range of from 11 to 17 years. No white spots were found in teeth examined from older persons.

Decalcified regions under apparently normal external enamel in initial carious lesions have been noted in roentgen-ray studies by many investigators, but no serious attempt has been made to reconcile this finding with the fact that caries begins at the enamel surface. Two possibilities may be considered:

1. The surface enamel was originally decalcified, together with the subsurface enamel, but recalcification of the external enamel subsequently took place.

2. The subsurface enamel was preferentially decalcified, whereas the outer enamel remained relatively unaffected.

Although recalcification of enamel has been reported, it is unlikely that it played an important role in the material here studied. The consistent finding in all the white spots studied, of a seemingly intact outer enamel, can be explained more easily by a mechanism of attack than by a more complex mechanism of attack and subsequent repair. This appears particularly true in advanced carious lesions which sometimes undermined and left intact small portions of external enamel.

The concept that the subsurface enamel was preferentially dissolved, leaving the surface enamel relatively intact, has much more to recommend it. For example, solubility studies on intact enamel have shown that the outer part of the enamel is more resistant to acids than the bulk of the enamel,[10] possibly because of much greater concentrations of certain elements such as fluorine[11] and lead[12] in the superficial portion than in the rest of the enamel.

Granted that the enamel surface is relatively resistant to decalcification, it remains to consider how decalcifying agents can penetrate through apparently normal outer enamel, and how the dissolved subsurface enamel can diffuse out. It is believed that this pattern of decalcification with demineralized enamel below seemingly unaltered outer enamel can be accounted for satisfactorily by the theory that acids are formed on the tooth surface which are sufficiently strong to dissolve minute fractions of the outer enamel and thus gain access to and decalcify the more soluble subsurface enamel. The resulting defects or porosities in the outer enamel might well be too small to be detected roentgenographically, yet sufficiently large to permit passage of many ions. Such defects could develop because of the preferential dissolution of carbonates or

10. Brudevold, Finn. Study of the phosphate solubility of the human enamel surface. J.D. Res. 27:320 June 1948.

11. Brudevold, F.; Gardner, D. E., and Smith, F. A. Distribution of fluoride in human enamel. J.D. Res. 35:420 June 1956.

12. Brudevold, F., and Steadman, L. T. Distribution of lead in human enamel. J.D. Res. 35:430 June 1956.

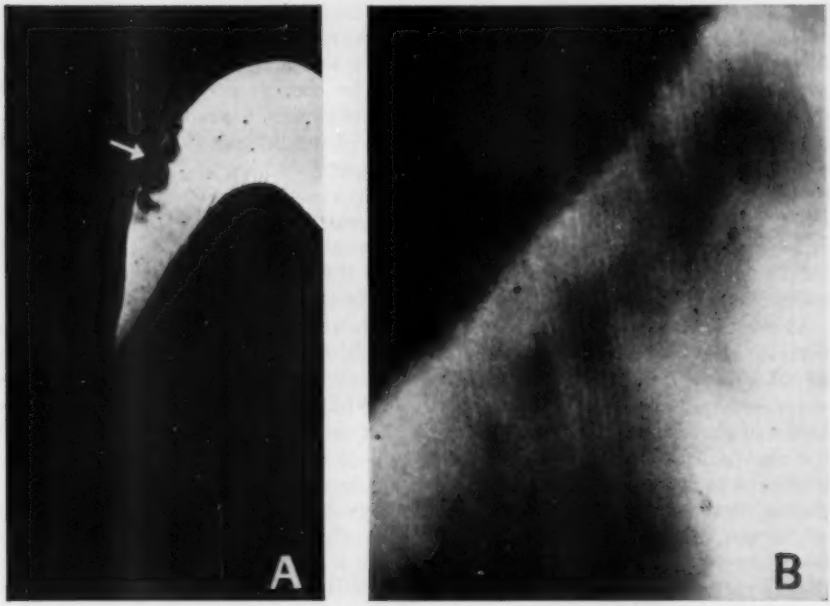

Fig. 2 • Microroentgenogram of brown spot. A: Magnification X8. B: Magnification X250

other relatively soluble constituents from the outer enamel. A gradual removal of carbonates from the most superficial part of intact enamel has been shown to take place with age,[13] and such removal is most likely to increase in the acid environment of carious lesions. Actually, there is no reason why decalcification of subsurface enamel could not proceed through microscopic openings in the external enamel, because the ions involved in the process of decalcification are extremely minute and will, for example, easily pass through semipermeable membranes. In this connection reference may be made to the observations that radioactive urea and iodine may penetrate through intact enamel.[14, 15]

According to the authors' microroentgenograms, decalcification of the subsurface enamel seemed to proceed in two directions: (1) along the prisms and (2) along the striae of Retzius. This is also suggested in the microroentgenograms of Bergman and Engfeldt.[1] The fact that the decalcification follows this pattern suggests that the acid either diffuses more easily through certain parts of the enamel, or that the solubility of different structures within the enamel varies. The decalcification along the prisms may be due to a preferential dissolution of either the core of the prism or the interprismatic substance.

The most favored view in the literature is that the interprismatic substance dissolves before the prism and that the interprismatic space is broadened by a gradual dissolution of the superficial part of the

13. Little, Marguerite F., and Brudevold, Finn. Distribution of inorganic carbonate in human enamel. (Abst.) J.D. Res. 34:708 Oct. 1955.

14. Wainwright, W. W., and Lemoine, F. A. Rapid diffuse penetration of intact enamel and dentin by carbon^{14} labeled urea. J.A.D.A. 41:135 Aug. 1950.

15. Bartelstone, H. J. Radioiodine penetration through intact enamel with uptake by bloodstream and thyroid gland. J.D. Res. 30:728 Oct. 1951.

prism. If this is true it would explain the apparent narrowing of the prisms in the region of the striae of Retzius as seen in Figure 1,D. Although the authors' microroentgenograms offer no conclusive evidence on this point, the observations of prisms protruding from the surface of the brown spot in Figure 2,B, without any visible support, suggest loss of interprismatic substance rather than pronounced decalcification and weakening of the prisms.

Decalcification along the striae of Retzius and outwards from there is of considerable interest in view of the uncertainty which exists with regard to the nature of the striae. Recently, Sognnaes[16] was able to demonstrate striae of Retzius in sections of decalcified enamel. He concluded that the striae were of organic origin and that they were related to a thickening of the prism sheath. This thickening of the prism sheath may well be associated with the presence of an increased amount of interprismatic substance deposited within and in proximity to the organic material of the sheath. Therefore, if the interprismatic substance is more soluble than the prism, then the striae with their greater bulk of interprismatic substance would be decalcified more easily than the surrounding enamel.

It is also possible that the enamel underlying each stria has accumulated small amounts of fluorine and other trace elements, just as occurs with the outer enamel of unerupted teeth.[11,12] Such an acquisition would be logical if, as is generally asserted, the striae of Retzius represent stages in the calcification of the enamel. According to this view each stria was at one time a temporary surface of the underlying already calcified enamel, and this surface may have persisted long enough to permit sufficient pickup of trace elements to bring about a reduction in the enamel solubility. This might explain why decalcification was pronounced on the peripheral sides of the striae, which represent enamel formed during successive periods, whereas the pulpal sides, representing the impregnated surfaces, appeared unaffected.

The concept presented here that the initial carious lesion is primarily the result of decalcification has been opposed by some workers who believe that proteolysis of the organic matrix is the predominant process. The prime importance of proteolysis was emphasized by Frisbie and Nuckolls,[17] who from a study of decalcified sections of early carious lesions postulated that decalcification by acid would necessarily cause cavitation in the surface. Recent laboratory studies by Darling[18] and Hals,[19] however, have shown that acid buffers can produce subsurface lesions in the enamel of intact teeth without breaking down the surface. There is no evidence that proteolysis can produce this effect. On the basis of present knowledge it must therefore be concluded that decalcification is the cause of initial carious lesions.

Results of this study show that the progress of the carious process depends on differences in the composition and structure of various parts of the enamel. The greater resistance to caries of surface enamel when compared with subsurface enamel is particularly interesting, and seems worthy of further investigation. An understanding of nature's way of reinforcing the outer enamel may well lead to more effective procedures for prevention of dental caries.

SUMMARY

1. White, initial carious regions with no visible break in the surface, brown

16. Sognnaes, R. F. Organic elements of the enamel. III. The pattern of the organic framework in the region of the neonatal and other incremental lines of the enamel. J.D. Res. 28:558 Dec. 1949.

17. Frisbie, H. E., and Nuckolls, James. Caries of the enamel. J.Am.Col.Den. 13:84 June 1946.

18. Darling, A. I. Early lesion of caries of the dental enamel. (Abst.) J.D. Res. 34:780 Oct. 1955.

19. Hals, Einar; Mörch, Tormod, and Sand, H. F. Effect of lactate buffers on dental enamel in vitro as observed in polarizing microscope. Acta Odont. Scandinavica 13:85 Aug. 1955.

spots and more advanced carious lesions were subjected to a microroentgenographic study by a method utilizing soft roentgen rays.

2. In the white spots, demineralization was observed in the subsurface enamel whereas external enamel appeared intact.

3. The demineralization seemed to progress along two pathways: (1) inward, following the enamel rods, but affecting the interprismatic substance to a greater extent than it did the rods themselves, and (2) laterally, along the striae of Retzius, affecting preferentially the enamel adjacent to the outermost edges of the striae.

4. Structural changes in brown spots and in advanced carious lesions of the enamel were similar to those seen in white spots, with the following exceptions: (1) less demineralization was generally seen in the white spots than in the other two types of lesions, and (2) the outer enamel appeared to be intact in the white spots and to be slightly affected in the brown spots, whereas, in the advanced carious lesions, it was lost except for undermined remnants which extended from the cavity margins.

5. It was concluded that the outer enamel was more resistant to carious attack than the subsurface enamel.

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Critical analysis of pain incidence during 1,508 operative procedures with rotating instruments

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During the last two decades there has been increasing interest in the use of high-speed rotary instruments for cavity preparations. Concomitantly there has been a corresponding increase of clinical and laboratory studies calculated to improve technics, increase speeds, reduce pain and supply more efficient instruments.

This study is concerned primarily with the use of rotary instruments in conjunction with a continuous air-water spray to determine the effect of the spray by itself, without local anesthesia, as a method of less painful or even painless cavity preparation. Secondarily, it is concerned with factors other than instrumentation. Consideration will be given to age and sex of patient, tooth, class of cavity, multiple cavity preparation and time of day.

REVIEW OF LITERATURE

A number of efforts have been directed toward the development of technics by which tooth substance can be removed either without pain or with a reduction in the amount of pain. These efforts have centered largely around the principle of reducing the amount of heat generated and transmitted to the pulp; most authors assume that pain is due primarily to heat.

Considerable experimental laboratory work has demonstrated rises in temperature during grinding or drilling, and reductions in temperature with application of air, water, or the air-water spray to

the rotary cutting instrument. Varying opinions are expressed[1-14] on the efficiency of the several methods used to cool rotary instruments, with most authors favoring the air-water spray.

The air abrasive handpiece[12, 15, 16] which operates at 160,000 rpm,[17] and an electric current applied to the tooth[18] are said to reduce or eliminate pain. Killilea[19] stated that the use of anesthesia may be cut 50 per cent by using air as a coolant. Thomas[20] and Fritz[21] reported that burs cooled with carbon dioxide reduced or eliminated pain.

Oman and Applebaum[22] and Oman[23] prepared cavities in patients using the ultrasonic method, and most patients reported no pain. Wasserman[24] did 1,000 preparations with ultrasonic equipment and reported that 80 per cent of the patients felt no pain, 15 per cent felt some pain, and 5 per cent felt pain. Other favorable reports on the ultrasonic method have been made by Steen[25] and Leatherman.[26]

Henschel[5] suggested a continuous fine stream of water at 100° F. with delivery of from 8 to 16 cc. of water per minute. He observed that drilling caused no pain in more than half of the patients, little pain in some, and that those requiring anesthesia received all other benefits of the water stream. He stated[27] that the pain experienced can be prevented in about half the patients by control of thermal change and that the other 50 per cent require anesthesia. Hyams[28] referred to the "analgesic properties" of a stream of water and recommended that the water be at body temperature. He reported on 25 preparations and stated that his patients expressed approval. Lieber[29] reported that a water flow produced painless results in 50 per cent of the patients, 25 per cent had some pain but were comfortable, and the rest required anesthesia. Sherman[30] used a vapor spray controlled by the patient and reported pain reductions. Lawton[31] stated that pain was much reduced under a water spray. Other favorable comments regarding the air-water spray have been made by Peyton,[32] Ingraham and Tanner,[33] and by Beebe.[34]

1. Bronner, F. J. Some studies on pulp and dentin reaction. D. Cosmos 74:535 June 1932.

2. Bronner, Finn J. Revolving motion versus rectilinear motion. A new principle in instrument design. D. Cosmos 75:491 May 1933.

3. Jeserich, P. H. Factors necessary to minimize thermal changes in tooth structure from operative procedures. New York J. Den. 5:275 Dec. 1935.

4. Willis, H. E., and Worner, H. K. Heat generated in cavity preparation. Austral. J. Den. 44:62 Feb. 1940.

5. Henschel, C. J. Pain control through heat control. D. Digest 47:294 July 1941.

6. Henschel, C. J. Friction of revolving steel burs. J.A.D.A. 31:895 July 1944.

7. Anderson, D. J., and VanPraagh, G. Preliminary investigation of the temperatures produced in burring. Brit. D. J. 73:62 Aug. 1, 1942.

8. Lammie, G. A. Comparison of the cutting efficiency and heat production of tungsten carbide and steel burs. Brit. D. J. 90:251 May 15, 1951.

9. Panzer, M. Comparison of the amount of heat generated during instrumentation of extracted teeth and during instrumentation of teeth in vivo. Unpublished thesis. University of Michigan School of Dentistry, 1951.

10. Vaughn, R. C., and Peyton, F. A. Influence of rotational speed on temperature rise during cavity preparation. J. D. Res. 30:737 Oct. 1951.

11. Peyton, F. A., and Henry, E. E. Problems of cavity preparation with modern instruments. New York J. Den. 22:147 April 1952.

12. Peyton, F. A., and Henry, E. E. Effect of high speed burs, diamond instruments and air abrasive in cutting tooth tissue. J.A.D.A. 49:426 Oct. 1954.

13. Hudson, D. C., and Sweeney, W. T. Temperatures developed in rotating dental cutting instruments. J.A.D.A. 48:127 Feb. 1954.

14. Peyton, F. A. Temperature rise in teeth developed by rotating instruments. J.A.D.A. 50:629 June 1955.

15. Black, R. B. Technic for nonmechanical preparation of cavities and prophylaxis. J.A.D.A. 32:955 Aug. 1945.

16. Black, R. B. Airbrasive: some fundamentals. J.A.D.A. 41:701 Dec. 1950.

17. McEwen, R. A. Accelerated handpiece speeds in restorative dentistry. New York D.J. 21:475 Dec. 1955.

18. Martin, D., and Flaschendreher, M. H. "Desensor," a new method for painless drilling. D. Echo 25:104 Sept. 1955. From D. Abs. 1:58 Jan. 1956.

19. Killilea, J. F. Air-conditioned handpiece. J.A.D.A. 32:966 Aug. 1945.

20. Thomas, B. O. A. Effectiveness of chilled burs in eliminating pain. J. D. Res. 30:361 Aug. 1941.

21. Fritz, J. R. Carbon dioxide anesthesia of the dentin in cavity preparation. D. Digest 60:448 and 497 Oct. and Nov. 1954.

22. Oman, C. R., and Applebaum, Edmund. Ultrasonic cavity preparation. Preliminary report. New York D.J. 20:256 June-July 1954.

23. Oman, C. R. Further report on the use of ultrasonics in dentistry. Ann. Den. 14:1 March 1955.

24. Wasserman, J. B. Report on ultrasonic drill. D. Survey 31:1442 Nov. 1955.

25. Steen, P. M. Ultrasonic method of jacket and veneer crown preparation. (Abst.) J. D. Res. 34:747 Oct. 1955.

26. Leatherman, G. H. The ultrasonic drill. J.A.D.A. 49:254 Aug. 1954.

27. Henschel, C. J. The importance of pain control. New York J. Den. 11:438 Dec. 1941.

28. Hyams, I. B. Tooth preparation under a flow of water. J. Canad. D. A. 10:435 Oct. 1944.

The clinical observations indicating the value of the air-water spray technic in pain reduction during operative procedures are unsupported by published data and appear to be largely the operators' own impressions of their clinical results. This reviewer found clinical reports on the use of the water stream, but failed to find any reports on the clinical use of the air-water spray in operative procedures.

METHODS AND MATERIALS

The present study was designed to include patients seen consecutively from the beginning of the study to its end. These patients were the usual ones seen in a general dental practice. No patient requiring cutting of the hard tissues of the teeth was excluded because of their anxiety or fear or other subjective factors. This method avoided any form of selectivity on the part of the operator. The first 1,508 preparations performed are the basis of this study. The total number of patients was 463, who ranged in age from 3 to 77 years; 271 were female and 192 male. For forty-four preparations local anesthesia was given in advance of the operative procedure at the request of the patients. Thus, of the total preparations 1,464 were performed initially without anesthesia. Of this latter group, 13 cavities were subsequently prepared under local anesthesia after the air-water spray failed to reduce the pain experienced. The other 1,451 cavities were prepared without anesthesia at any time, although some of the patients would have preferred an anesthetic had they known in advance that the preparation would be painful to complete. These failures in pain reduction or elimination will be listed later in the paper, as will successful and moderately successful procedures.

To establish criteria for pain, a subjective symptom, is difficult. For purposes of this study, three categories of subjective reactions were used:

1. If the patient said he had no pain during the operative procedure, he was recorded as having experienced "no pain" (NP).

2. If the patient said he had considerable pain, that he would have preferred an anesthetic, or otherwise indicated his dissatisfaction, he was classified as having had "pain" (P).

3. If the patient experienced a moderate amount of pain, a "twinge," a "spot," or otherwise indicated that he was neither free from pain nor suffered excessive pain, he was placed in the category of "moderate pain" (M). The patient reaction in each instance was determined only by himself, with no suggestions on the part of the operator. All data were recorded at once before the next patient was seen.

A standard dental engine with resistors removed was used. For diamond stones and carbide burs, the speed employed averaged from 10,000 to 13,000 rpm as measured by a tachometer. When steel burs were used, the speed was maintained at from 2,000 to 4,000 rpm. Light pressure was employed with all rotary instruments, including steel burs. In all instances the rotary instruments were applied to the tooth intermittently.

A solenoid valve was installed in each dental unit and joined to the air and water supply, then synchronized with the engine foot control in a manner which permitted the spray to operate immediately while the engine was gaining the speed required. The water and air were

29. Lieber, Leon. Thermal control apparatus for dental drilling. J.A.D.A. 33:1117 Sept. 1946.

30. Sherman, J. A. The vapour spray method for control of pain. J. Canad. D. A. 13:11 Jan. 1947.

31. Lawton, F. E. Control of frictional heat in cavity preparation. Brit. D. J. 83:75 Aug. 15, 1947.

32. Peyton, F. A. Temperature rise and cutting efficiency of rotating instruments. New York State D.J. 18:439 Nov. 1952.

33. Ingraham, Rex, and Tanner, H. M. Adaptation of modern instruments and increased operating speeds to restorative procedures. J.A.D.A. 47:311 Sept. 1953.

34. Beebe, D. M. Efficiency of high operating speeds with water lubrication in cavity preparation. J.A.D.A. 49:650 Dec. 1954.

Table 1 • Patient reactions when cavities were prepared in permanent teeth

Reaction*	Number of preparations	Percentage of total preparations	
NP	350	28	88% tolerable
M	749	60	
P	149	12	

*NP = no pain; M = moderate pain; P = pain.

ejected as a water spray at the end of the contra-angle or handpiece through a commercially available outlet, in a manner that caused the spray to reach the tooth and the cutting instrument. The water and air reached the outlet through a plastic hose joined to the solenoid valve. Average water output from the spray was measured at various times and found to be 10 cc. per minute, with a low of 8 cc. and a high of 13 cc. The water temperature averaged 63° F. with a low of 61° F. and a high of 65° F.

Cavity preparations generally were made using the technic described by Ingraham and Tanner[33] with such variations as might be expected of individual operators. All cavities except Class III were prepared with diamond stones and carbide burs or both, with only minor exceptions. Class III cavities were prepared with steel burs, and occasionally with a small carbide bur. Hand instruments were used in the conventional manner for planing walls, beveling margins, and often for excavating deep caries when it was felt that such excavation was safer than using rotary instruments.

OBSERVATIONS

Preparations were made in 1,248 permanent teeth and the results in terms of patient reaction are shown in Table 1.

Table 2 shows patient reaction to preparations made on permanent teeth, grouped according to the class of cavity prepared. The highest percentage of painful preparations is to be found in Class II cavities (13 per cent) and in Class V cavities (20 per cent).

Preparations were made in 210 deciduous teeth with the results shown in Table 3. The greater number of deciduous teeth may be prepared with little or no pain under the air-water spray.

Patient reactions to preparations in deciduous teeth were classified according to cavity class in Table 4. Most of the cavities were Class I and Class II and there are no major differences in reactions in either of these classes except that a slightly higher number of patients with Class II cavities exhibited pain than with Class I. The numbers of Class III, Class V and miscellaneous preparations are too few to analyze.

Cavities were classified according to their condition before operating as follows: caries only; amalgam filling and caries (or amalgam filling only); silicate filling and caries (or silicate filling only); caries and inlay; caries and acrylic resin filling, and no caries. The overwhelming bulk of the teeth operated on fell into the first three categories. The remainder were too few for study. Table 5 shows the first three categories of teeth and the

Table 2 • Patient reaction by class of cavity in permanent teeth

Reaction	Class I		Class II		Class III		Class V		Miscellaneous*	
	No. of preps.	% of total	No. of preps.	% of total	No. of preps.	% of total	No. of preps.	% of total	No. of preps.	% of total
NP	104	35	57	20	102	38	35	12	52	37
M	167	56	189	66	140	52	180	66	73	52
P	23	7	38	13	21	8	54	20	13	9

*Includes lingual and buccal pits, cusp tips, full crown preparations, three-quarter crown preparations, jacket crown preparations and Class IV cavities.

Table 3 • Patient reactions when cavities are prepared in deciduous teeth under the air-water spray

Reaction	Number of preparations	Percentage of total preparations	
NP	110	52	93% tolerable
M	87	41	
P	13	6	

results of working on them in terms of patient reaction. The proportion of "pain" reactions is lowest in the silicate filling category and the proportion of "no pain" is highest in that category. The significance of this observation is diminished by the small number of cavities prepared.

The relation between the age of the patient and the reactions reported during operative procedures was tabulated. The proportion of "no pain" reported is highest in the youngest groups and generally becomes progressively less as the age of the patients increase, at least up to 50 years of age. After age 50, the numbers are too few for analysis. The relative regularity in decrease of "no pain" reported in the age groups from 3 to 50 years is almost comparable to the increase in the percentage of cavities reporting "moderate pain" with an increase in age. The age groups reporting the highest percentage of "pain" reactions are from 10 to 15 years, and from 20 to 25 years, both of which periods show small peaks.

When the large number of preparations made are broken down into the 16 separate tooth categories, numbers are too few to give significant results. No particular pattern is evident.

Seven hundred and twenty-three preparations were made on the upper teeth and 524 on the lower. Painful reactions occurred in the two arches in about the same frequency (upper 11 per cent, lower 12 per cent). The preparations in the lower arch showed a higher percentage of "moderate pain" (64 per cent) than did those in the upper arch (56 per cent). In the upper arch there was a higher percentage of "no pain" (31 per cent) than in the lower (24 per cent).

Patient reaction to preparations done in the morning, the afternoon, and the evening were tabulated. Six hundred and thirty preparations were done in the morning, 504 in the afternoon and 120 in the evening. There was no difference, in terms of pain, as to the time of day in which a preparation was made. "No pain" averaged 29 per cent, "moderate pain" averaged 59 per cent and "pain" averaged 11 per cent in all three time intervals.

Eight hundred and ninety-eight preparations were made on females and 563 on males. Females showed 32 per cent "no pain," 55 per cent "moderate pain," and 12 per cent "pain." Males showed 31 per cent "no pain," 59 per cent "moderate pain" and 9 per cent "pain." There appear to be no significant differences in reactions because of sex.

In 93 instances two cavities were prepared on each patient at the same appointment, for a total of 186 prepara-

Table 4 • Patient reactions by class of cavity in deciduous teeth

Reaction	Class I		Class II		Class III		Class V		Miscellaneous	
	No. of preps.	% of preps.	No. of preps.	% of preps.	No. of preps.	% of preps.	No. of preps.	% of preps.	No. of preps.	% of preps.
NP	41	55	57	54	10	55	1	*	1	*
M	31	41	41	39	8	45	3	*	4	*
P	2	3	7	6	0	—	3	*	1	*

*Percentages of no significance.

Table 5 • Patient reaction to operative procedures and relation to previous condition of tooth

Reaction	Caries only		Caries-amalgam		Caries-silicate	
	No. of preps.	% of preps.	No. of preps.	% of preps.	No. of preps.	% of preps.
NP	353	33	56	21	38	36
M	569	54	184	68	63	60
P	124	11	28	10	4	3

tions. It was noted that every possible combination was produced in terms of patient reaction. In other words, if the first cavity was painful, the second cavity could be painful, moderately painful, or painless. It was not possible to predict from the first preparation what the second would be. The likelihood of the second cavity producing the same reaction as the first exists in a ratio of 2:1; pairs with the same reaction totaled 66 per cent and pairs with varying reactions, 33 per cent.

In 67 patients in each of whom 6 or more preparations were made, it was shown that every reaction is possible in the same patient operated on at various times. Only 3 of the 67 patients exhibited consistent reactions with every preparation made.

DISCUSSION

The review of the literature indicates that several technics are available for cutting the hard tissues of the teeth without using local anesthesia, which can be done without pain or with a reduction in pain. These clinical experiments do not, except incidentally, compare the given technic with other methods of cavity preparation and are to that degree uncontrolled experiments. This is equally true of this study which reports the use of a given method without making comparisons with any standard. Comparative studies would be of considerable value.

The observation that there was a higher percentage of "no pain" with the teeth operated on in the upper jaw is probably accounted for by the fact that the less sensitive Class III cavity is more frequently encountered in the upper than in the lower jaw.

The deciduous teeth were found to be more favorably responsive to the water spray than the permanent teeth, a fact which is most important in pedodontics, and which permits the dentist to perform operative work on children without, in general, producing lasting fear of the dentist. The fact that the deciduous teeth are less hard than the permanent teeth permits the rapid completion of operative procedures in these teeth using the air-water spray alone, without using anesthesia.

It is important, for a number of reasons, to perform operative dental procedures without the use of local anesthesia when possible. Any untoward reactions which may follow administration of an anesthetic are, of course, avoided if the anesthetic is not administered in the first place. In a recent study[35] it was noted that various local anesthetics and their administration were capable of producing hematoma, edema, palpitation and other effects. The possibilities of infection and trismus as sequelae of administering local anesthetics are well known. When indicated, the local anesthetic is still the boon it ever was, but when used indiscriminately it merely increases operative risks. The fear of "the needle" which so many people have is also relieved when the needle is not required. The air-water spray permits a substantial reduction in the number of hypodermic injections.

The knowledge that Class I and Class III cavities can be prepared under an air-water spray with a high percentage of "no pain" or "moderate pain" has a certain clinical value. It might be well,

35. Sherman, Harold; Fiasconaro, J. E., and Chilton, N. W. Comparison of the clinical effectiveness of the higher potency local anesthetics in operative dentistry. J.A.D.A. 48:151 Feb. 1954.

when a choice is available, to start work on a patient with one of these classes of cavities, thus instilling a degree of confidence in the patient for the operator, to their mutual advantage.

A limited clinical value exists in the fact that by a ratio of two to one the second cavity prepared on a patient at the same sitting is likely to react as did the first preparation. The operator may feel encouraged to do a second preparation if the first has been accomplished either without pain or with a minimum of pain, and he may likewise decide on the same basis not to try a second preparation on the same day if the first was painful.

Further study of the age factor and its relation to pain incidence in operative procedures is being conducted in the expectation that additional data may reveal facts on this subject not known at this time and not explained with these data.

Hardy, Wolff and Goodell[36] stated that in several persons tested, the pain threshold did not vary consistently with time of day. Insofar as the patients in the present study are concerned, this observation appears to be true and confirms their opinion.

SUMMARY AND CONCLUSIONS

A clinical evaluation was made of the effectiveness of the air-water spray used with rotary instruments in dental operative procedures, without local anesthesia, in an effort to determine the pain-reducing effects of the spray. A review of the literature revealed many comments regarding the effectiveness of the spray, but no clinical case reports which actually substantiated this usefulness.

Fourteen hundred and sixty preparations were performed without using anesthesia on 463 patients, 271 female, 192 male, aged 3 to 77 years, in the private office of the author. Their reactions were reported as "no pain" (NP), "moderate pain" (M) and "pain" (P).

Modified standard equipment was used, with a handpiece speed of from 10,000 to 13,000 rpm for carbide burs and diamond stones and from 2,000 to 4,000 rpm for steel burs, all used intermittently with light pressure. An average of 10 cc. of water per minute was delivered at a temperature of approximately 63° F.

It was found that sex, time of day and arch being worked on had no bearing on patient reaction to operative procedure. In the preparation of 1,248 permanent teeth, "no pain" was found in 28 per cent, "moderate pain" in 60 per cent (total 88 per cent tolerable) and "pain" in 12 per cent. Deciduous teeth showed "no pain" in 52 per cent, "moderate pain" in 41 per cent (total 93 per cent tolerable) and "pain" in 6 per cent. Deciduous teeth grouped by class of cavity showed no significant differences, whereas in permanent teeth there was less pain in Class I and Class III than in Class II and Class V cavities.

The tabulation of results by tooth were inconclusive. Paired cavity preparations showed a tendency to repeat reactions in a ratio of two to one, but preparations made at various times on the same patient produced inconsistent results. The previous condition of the cavity produced no significant differences, except that those having silicate fillings gave less pain than others. Age appeared to result in a gradual decrease in the percentage of "no pain" reported and an increase in the "moderate pain" category. Peaks of pain appeared to be present at from 10 to 15 years of age and 20 to 25 years of age.

Any rotary instrument, used at its proper speed with the air-water spray, is capable of producing painless or nearly painless results in the overwhelming number of patients undergoing operative preparations without the need for anesthesia.

7540 Balboa Boulevard

36. Hardy, J. D.; Wolff, H. G., and Goodell, H. The pain threshold in man. In Pain. Association for Research in Nervous and Mental Disease. Vol. 23. Baltimore, Williams & Wilkins, 1943.

Conditioning parents in the practice of dentistry for children

Roy M. Wolff, D.D.S., St. Louis

The biggest problem that most dentists face in the treatment of children is that they have more trouble controlling the parents than they do the child. Consequently, many dentists are prone to discourage children as patients, but such an attitude is unwarranted. A definite method of controlling dental practice where it concerns children must be adopted in every office.

As in any business or organization, so in the dental office there must be certain rules and regulations. Many professional men do not set up rules, or if they do, are prone to allow them to be broken. The most important rule most frequently broken is that one which forbids patients to control dental practice, especially where it involves children.

One excellent method for conditioning the parents in controlling dental treatment for children was gained by an idea taken from a magazine[1] and modified to suit my personal requirements. The adoption of this method has regulated my practice to my complete satisfaction, and that of most of the children's parents.

PRINTED SUGGESTIONS

"Suggestions for Parents" is the title of a message to the parents. Printed on a simple card, it states:

1. If a child's mouth is to develop and grow properly, the first (deciduous) teeth must be healthy.

Dentists should start educating the public as early as possible to correct nomenclature, hence the use of the word deciduous rather than baby teeth.

2. At the first visit the teeth are cleaned and roentgenograms made. If the child is suffering from a toothache, emergency treatment will be made. No fillings will be done on the first visit. An account of the services to be rendered and the cost of the complete treatment will be given the parents on the second visit before any restorations are begun.

As an initial step, the parent has been informed that the child's teeth will be cleaned and roentgenograms made. Later when the parent comes into the operatory, having been told what the first steps in treatment are, he cannot say that he does not want these things done, and at the same time he knows that the initial treatment will cost some money, even though no fillings have been made.

3. No parents are allowed in the operating room during treatment of the child.

This is the key to the problem of dentistry for children, and this is where so many dentists fail to control their practice: they do not have the nerve to keep the parents where they belong. The dentist is correct in taking this position. When a customer goes to the bank he is not permitted to go behind the counter and count out money. When a man's wife goes to the hospital to have a baby, he is not allowed in the delivery room. The reason for such rules is that the layman does not know anything about what

1. Kelston, L. B. Handling the parent of the difficult child patient. J.Den.Children 17:9 Third Quart. 1950.

should be done. If he did, he would not seek professional service. So with dental treatment. In the dentist's office it is amazing how soon the child's tears are turned off after the operatory door is closed and the child is separated from the parent. Also, in the absence of the parent, disciplinary management can be applied if necessary.

4. Parents will be called into the operating room after treatment has been rendered the child. Please do not join in the discussion while the doctor is speaking to your child. Remember, your role in the office is that of the silent partner. If you talk while the doctor does, your child will listen to no one. The doctor will discuss the child's problems with you at the proper time.

By adhering to this rule, the dentist lets the parent know that he is to be quiet and listen to what a professional person has to say on the subject of dental health education of the patient. It is all right to listen to the parent, but sometimes the parent will be doing all the talking and the dentist will do all the listening. In that situation, the dentist cannot get across the points he wishes to make.

5. It is essential that you discuss dentistry at home so that your child understands why he is being brought to the dental office.

In ascertaining that the parent understands all the points listed on the card, the dentist tells the parent to discuss dentistry with the child in the proper way and not by saying, the night before the dental visit, "Well, I'm glad it's you that's going to the dentist tomorrow instead of me. The last time I went they stuck me with that big needle and almost broke my jaw." The home dental discussion with the child should be reassuring and constructive.

6. Please refrain from saying, "The doctor will not hurt you." Instead say, "The doctor will be very gentle while working." The dentist will treat your child as he would his own were he rendering dental service on them. The important thing is to do the dental work and do it correctly. Children's dentistry is not a game or plaything, it is a health service.

Some dentists have the wrong idea about working with children. They tend to play with the young patient, to ride them up and down in the chair, or to take them on a sight-seeing trip around the office. That procedure is all right if the dentist is going to be paid so much an hour for professional baby sitting, but the parent has brought the child in for dental treatment, not entertainment. In the office being described, the procedure is to get the child seated in the chair, the work done, a reward given him or her, and the patient returned to his parent because the only time the dentist is productive financially is when he is working in the child's mouth.

7. Please do not be upset if your child cries. Crying is normal reaction to fear. Children are afraid of anything new and strange.

Crying is a form of noisy cooperation.

8. It is our policy to receive payment as our work progresses. A charge will be made for broken appointments unless cancelled 24 hours in advance.

With the printing of this last rule, the parent is informed that the dentist enjoys being paid for his services and that the office is not a Community Chest agency. Emphasis placed on this last statement has caused a great improvement in office collections, and there have been fewer cancellations.

After the parent has read the suggestion card and indicated his or her willingness to accept the policy of the office, he is asked to fill out the typical questionnaire.

The procedure involving the suggestion card has caused the loss of only two patients in the two years the author has used the method outlined. One, the father of a five year old child, objected because he could not come into the operatory with his daughter. The other was a man who did not want roentgenograms made on the grounds that they were unnecessary. To the former the author said, "No hard feelings, but I don't tell you how to run your business. I don't expect you

to tell me how to run mine." To the second parent he did not even comment, venturing the thought that the parent would not ride one block with a blind taxicab driver, and when a dentist works without roentgenograms he is doing just that.

A statement made by Miss Archanna Morrison applies to such a situation: "To see is to know and not to see is to guess." If the dentist is going to practice dentistry by "guesswork," and is going to let his patients control his practice, he had better close the door to his office and go fishing.

TREATMENT METHODS

When all preliminary discussion leading up to the beginning of the actual services has been dispensed with, the dental assistant takes the child into the operatory, places the patient in the chair, and then the dentist takes over. He greets the child, states that he is going to clean the teeth, and take some pictures of them. He shows the patient the rubber cup on the contra-angle handpiece, dips it in pumice and runs it on the child's fingernail. This demonstrates what is to be done and the dentist proceeds to give a prophylaxis.

Ready to make roentgenograms, the dentist shows the patient the way the x-ray machine works and explains that the child will feel nothing, but will hear a buzzing noise. The patient is shown the film and told, "Now, it's just a piece of paper, and it won't hurt you." Sometimes the author even bends the film on the end of the patient's nose. It is then placed in the upper anterior portion of the mouth and the patient is told to bite on it as if for an occlusal exposure. The cone is then placed on the tip of the nose at an angle of plus 65 degrees. Using finger movements, the dentist signals the assistant when he is ready for exposure. No oral commands are given, as children will sometimes turn their heads when hearing a voice, and the film will be spoiled. When the first exposure has been made and the child finds nothing unusual in the experience, the dentist has secured the confidence of the patient and can proceed.

For the lower anterior portion of the mouth, the film is positioned in the same manner and the cone is placed at an angle of minus 40 degrees, so that the rays strike the mandible at the midline. The posterior exposures are next.

For use with younger children with small mouths the small film 0 size is recommended. The films are held in place by means of small wooden film holders. Bitewing roentgenograms, when necessary, are made either on the size 0 film, or on the regular periapical film, depending on the size of the child's mouth. At no time during any of the exposures does the child or the operator hold any of the films with their hands. All films are held by the teeth of the patient.

After the roentgenograms have been completed, the parent is called into the operatory and asked to stand at the front of the chair so she can look into the child's mouth. The parent is told the following:

> I want to talk to you about your child's teeth but when referring to the "first teeth" or "baby teeth" I will use the term deciduous teeth and, when referring to the "second teeth" I will say secondary teeth or perhaps, permanent teeth, which is the term more commonly used—mistakenly, I believe, because nothing in this world is permanent.

The dentist will start in the upper left portion with the region of the first permanent molar and point out that tooth or, if it has not erupted, the region where it will erupt, and then proceed around the arch explaining each tooth and its shedding time and the eruption time of its successor. At this time the book which is published by the American Dental Association, *Your Child's Teeth,* has been placed in the patient's lap. The book is opened to page 11 on which are

listed the eruption and shedding times of both the deciduous and permanent teeth, and this table is referred to as it relates to each tooth. The dentist also points out the cavities and other oral conditions that are present, both normal and abnormal.

When the discussion relating to all the teeth is finished, sweets, diet and toothbrushing are brought up. It is amazing how few parents brush their children's teeth. When the parent is asked if he or she feels the child is doing a good job in brushing its own teeth, most of the time the answer is in the affirmative. The dentist, to test the child, unwraps a new toothbrush, hands it to the patient and asks the child to show how the teeth are brushed. After the patient has demonstrated—usually by brushing the anterior teeth—a demonstration is given the parent by the dentist as to how she should brush her child's teeth.

In explaining the amount of sugar in various foods, the book, *The A B C's of Dental Decay,* is used. Written by Dr. Charles A. Sweet, Sr., of the College of Physicians and Surgeons, San Francisco, an authority on pedodontics, this book adequately handles the problems of sweets and diets.

Before being dismissed, the child is given a comic book published by the American Dental Association. The dentist points out in the book a likeness of the child having roentgenograms made of his teeth and having his teeth cleaned. The child is told, "See, they've even written a comic book about you going to the dentist." The parent is then told that the work for the visit has been done, and the fee for the service is named.

At the next visit, before starting any treatment, the dentist sits down with the parent and explains the condition of the child's mouth as shown by the roentgenograms, the services that are necessary, and what the cost of the investment in the child's mouth will be. The parent is also told that the dates for the appointments will be made by the assistant, and that the work will be done in five visits or less.

In operating procedures the dentist has long appointments—a half hour to an hour. Work is completed on at least one quadrant each visit. Where necessary, local anesthesia is used. High-speed, drilling with air and water coolants, and the Vacudent (an appliance which makes use of a vacuum principle) are used by the dentist. Some may have heard the use of the latter referred to as the washed field technic. It is another adjunct to operative dentistry, enabling the dentist to perform his work quicker, less painfully, and with better preparations.

Since using high speed, air and water, the author has reduced the use of local anesthesia in his operative cases from 95 per cent to 25 per cent. Children don't like shots. They don't want the needle. Anything that can be done to eliminate pain and to increase the speed of operating time so as to get more work done each visit makes for a happier dental patient. It is amazing how well the parent likes this system, because she does not want to be making 15 or 20 trips bringing her children to the dentist. The parent's time is valuable. And children today have a busy schedule watching television so that they do not want to be making a lot of trips to the dentist's office.

This system is much more remunerative for the dentist because he spends less time ushering patients in and out of the chair. When discussing the child, the author tells the parent what the cost of treatment for the child will be. One fee is stated, and a promise made that the work will be completed in so many visits. He explains that the work will cost the same whether it is done in 5 or 15 visits. Parents always agree it is preferable to complete the treatment as quickly as possible. There is no hesitancy in telling the parent that the fee for the work will be $100.00 and that it will be done in four visits. It is all right with the dentist if the par-

ent figures out that this will be $25.00 a visit. There is no difference between coming four times and spending $100.00 and coming 20 times and spending the same amount. The parent benefits from the fewer visits because of less time lost from work and less money spent on transportation, baby sitters, and so forth.

The reason there are dentists today known as "cotton changers" is because these men do not have the nerve to look the patient in the eye and say, "I will render this service in four visits and the fee will be $100.00." The dentist has only so many productive hours each day and when he is escorting patients in and out of the chair that is nonproductive time. It is costing the dentist money. He should eliminate this parade of patients in and out of the waiting room; he should see fewer patients and make his time more remunerative.

Another thing that's so important in the office of the author is auxiliary personnel. How a dentist can operate without an assistant is difficult to understand —and he will be just about as effective as a one-armed paper hanger, and just as overworked. The dentist who asserts that he does without the services of an assistant to keep down his overhead may not only do that—he is also keeping down his gross and his net income. Many girls are seeking employment these days. Dentists can help eliminate unemployment by hiring more help, at the same time achieving more income and using less energy.

Another thing done in the office which pleases both dentist and his assistants is the wearing of colored uniforms. The girls wear blue linen jumpers, white blouses and blue shoes. The dentist wears yellow slacks and sport shirt, green shoes and belt. At first glance they may not look anything like people who work in a dental office, but patients soon realize that the colored clothing is rather distinctive and different. When the child patient sees the dress of the personnel, he does not associate his dental visit with that of his last trip to the pediatrician who gave him the shot that hurt. He looks at the pretty colors and says, "Well, maybe this isn't going to be so bad after all." Why colors? The hairdresser at the beauty shop, the girl who cleans the tables and removes the dishes in the restaurants wear white. Why shouldn't dentists be different?

The dentist does not have to limit his practice to pedodontics to have a successful practice with children. Treat the child as an adult. Charge the same fee as for an adult. Bread costs the same whether it is eaten by an adult or a child. Parents should not expect lower fees for work on children. When asked by Mrs. Smith what the fee will be for filling a tooth for her child, the dentist replies:

> Mrs. Smith, I don't charge any more to fill the tooth of your child than I would for your tooth, although you must realize it is much harder and more strenuous to work on your child than on you.

Parents will agree and be happy and satisfied with the answer.

The dentist will find that by properly conditioning parents to this method of dentistry for children he can realize a pleasant and profitable practice with child patients.

SUMMARY

The dentist should do good dental work; keep the parents in the waiting room; charge the same fee for a child as for an adult; maintain a thorough recall system; give the child a small reward for being a good patient; teach the parents that it is important that the child retain deciduous teeth in healthy condition until the proper time for their shedding.

If these suggestions are followed the dentist will enjoy a much more pleasant and profitable phase of dentistry as it concerns child patients.

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A critical survey of the methods of instrument disinfection and sterilization

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The objective of disinfection and sterilization is destruction of microorganisms which are pathogenic or which possess pathogenic potential. If the methods of accomplishing this are effective, transmission of infectious diseases will not be likely. In addition to destroying disease-producing microorganisms, diligence and care should be exercised. Pathogens should not be introduced nor should microorganisms be transferred from the external environment or from body surfaces into host tissues. In the latter event, even usually inocuous microorganisms may acquire pathogenicity.

The methods of destroying microorganisms are many. This is predicated on the fact that there is no single method which can be used in every situation or, even further, which is always the most effective. A clear understanding of what is to be accomplished, a knowledge of the most effective way of doing it, and a prediction of the results are the guides used in selecting the method.

It is the purpose of this paper to present a survey and evaluation of the methods of disinfection and sterilization suitable for instruments, materials and equipment used in surgery and in the clinical practice of dentistry and medicine.

MICROORGANISMS OF MEDICAL SIGNIFICANCE

Microorganisms of medical significance can be grouped according to cellular complexity, living requirements, size, morphology and manner of reproduction into the following categories: bacteria, fungi (yeasts and molds), rickettsiae and protozoa. The viruses, although unlike microorganisms in some respects, are nevertheless included with them. Each group has members pathogenic to man. Bacteria are the best known of the groups, probably because they are responsible for the greatest number of the infectious diseases of man and because they are the easiest to study. The pathogenic members of other groups, however, cannot be disregarded. Some of the most serious of the infectious diseases are caused by this latter group. Disease prevention measures cannot ignore any of the various groups.

Microbicidal studies are usually complex and at times misleading. Several factors contribute to the complexities of such studies. Among these are the influence of temperature, moisture, oxygen and nutrition on microbial hardiness, the wide range of resistance to destructive forces, and the antimicrobial specificity of many of the chemical agents. It is nevertheless true in a broad sense that microorganisms are destroyed by similar methods and agents.

BACTERIAL SPORES

There is unanimity of opinion that of the microorganisms, bacterial spores are the

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most difficult to destroy.[1-5] One textbook[3] points out that some bacterial spores can withstand boiling water for 16 hours, and that anthrax spores have been known to germinate after being in the dry state for ten or more years. McCulloch[4] describes an instance in which he was able to recover viable spores from a strip of bandage gauze which 40 years previously had been soaked in the blood of a cow dead of anthrax. The gauze had been dried and had remained during all these years exposed to diffuse sunlight within a white glass bottle. It is well known that chemical agents are notoriously ineffective against bacterial spores. Kelly and Hite[1] state in their textbook on microbiology that anthrax spores have survived 5 per cent phenol for 24 hours.

Because of the remarkable indestructiveness of bacterial spores, proof of sporicidal effectiveness is acceptable evidence of capacity to kill all microorganisms. It is a fortunate circumstance that only a few of the pathogenic bacteria are spore formers. One of these, *Bacillus anthracis*, produces disease primarily in animals. It infects man secondarily as an occupational disease in those handling infected meat or animal products. Nearly all of the other pathogenic spore-forming bacteria are not strictly parasitic since they are unable to grow in healthy uninjured tissue and produce disease only in the presence of dead or traumatized tissue. Spores of the latter group are found in abundant numbers in richly fertilized soil. When infection results it usually follows deep, lacerated, torn or traumatized wounds contaminated by soil or organic debris.

Pathogenic spores require optimum conditions for germination and growth. These conditions are unlikely under the condition of cleanliness that usually prevails in hospitals and private clinics. In view of this, it is considered sufficient preparation in routine clinical procedures or in minor surgery to use methods which destroy the usual disease-producing microorganisms but not necessarily bacterial spores.

TERMINOLOGY

A number of terms relating to infection and more recently to destruction of microorganisms has arisen throughout the years. Most of these have undergone change in meaning with expanding knowledge in microbiology. Since scientific terms must connote exact meaning, the need of a standard terminology in this field has long been recognized. One report which has helped clarify this situation is that by Patterson.[6] After a careful study of the subject he set forth definitions reflecting current usage of a number of important and commonly used terms. He gives the following definitions:

> Germicide, n. Anything that destroys germs (microorganisms); applied especially to agents that kill disease germs . . . as the words are ordinarily used, the germs referred to are those of disease. The chief point of controversy that could arise is with reference to differences in resistance. In practice it is assumed that a substance represented as a germicide, when used as directed, will kill all ordinary disease germs, but is not necessarily required to be capable of destroying bacterial spores. In combating diseases such as anthrax or tetanus, caused by spore-forming bacteria, germicides or procedures specially effective against spores will be required.
>
> Antiseptic, n. A substance that opposes sepsis, putrefaction or decay; one that prevents or arrests the growth or action of microorganisms, either by inhibiting their activity or by destroying them; used especially of agents applied to living tissue.

1. Kelly, F. C., and Hite, K. E. Microbiology. New York, D. Appleton, Century, Crofts, Inc., 1949.

2. Zinsser, H. Textbook of bacteriology, ed. 10. New York, D. Appleton, Century, Crofts, Inc., 1952.

3. Jordan, E. O., and Burrows, W. Textbook of bacteriology, ed. 15. Philadelphia, W. B. Saunders Co., 1949.

4. McCulloch, E. C. Disinfection and sterilization, ed. 2. Philadelphia, Lea & Febiger, 1945.

5. Perkins, J. J. Bacteriological and surgical sterilization by heat. In Antiseptics, disinfectants, fungicides, and chemical and physical sterilization, Reddish, G. F., editor. Philadelphia, Lea & Febiger, 1954.

6. Patterson, A. M. Meaning of antiseptic, disinfectant, and related words. Am. J. Pub. Health 22:465 May 1932.

Disinfectant, n. An agent that frees from infection; usually, a chemical agent which destroys disease germs or other harmful microorganisms (but not, ordinarily, bacterial spores); commonly used of substances applied to inanimate objects.

Sterilization, n. The act or process of sterilizing, or freeing from all living microorganisms.

A study of these terms makes it evident that sterilization is the only procedure which destroys all microorganisms. Therefore, whenever the threat of inducing infection is unusually great, methods which sterilize provide the greatest safety.

Ordinarily it is required that the methods or agents used to destroy microorganisms do not damage instruments, equipment or surgical materials and are not obnoxious, expensive or dangerous to use. Of the various practical methods of disinfection or sterilization, the use of heat is the most reliable, least expensive, and most easily carried out (Table 1). It is the only means which gives complete assurance if correctly employed that bacterial spores or the more resistant varieties of microorganisms such as those which cause tuberculosis or viral hepatitis will be destroyed.

USE OF HEAT

Heat may be employed in two forms—dry and moist. It is believed that moist heat kills by coagulating the protoplasm of microorganisms, whereas dry heat kills by an oxidation process.[5]

Other factors which determine the effectiveness of heat besides moisture are temperature and length of time.

BOILING WATER

Boiling water for 10 to 15 minutes is the usual clinical method of disinfecting instruments. Boiling water has a temperature of approximately 100°C. at standard atmospheric pressure. It is generally stated that boiling water at 100°C. is capable of destroying all microorganisms except bacterial spores within a few minutes.[2, 7, 8] Several recent experimental studies have demonstrated the capacity of boiling water to destroy rapidly all microorganisms except bacterial spores.[9, 10] Immersion of instruments in boiling water for 15 minutes undoubtedly provides a wide safety margin in all instances except where bacterial spores are present. Instruments so treated should be termed disinfected rather than sterilized.

Infection by bacterial spores under ordinary circumstances is unlikely. This fact makes boiling water an acceptable method of disinfection for routine clinical procedures or minor surgery. In major surgery, or if contamination by bacterial spores is suspected, methods which assure spore destruction should be used.

Recently, some questions have been raised as to the capacity of boiling water to destroy the viruses of homologous serum hepatitis and infective hepatitis. Evidence exists that these pathogens are unusually hardy and more resistant to destruction than most bacteria.[11-13]

Specific information regarding the effect of boiling water, or for that matter, any method of disinfection or sterilization, in preventing viral hepatitis is lacking. Therefore, as Neefe[14] points out, it is difficult to define what constitutes sterilization in respect to the causative agents of these diseases.

7. Appleton, J. L. T. Bacterial infection, with special reference to dental practice, ed. 4. Philadelphia, Lea & Febiger, 1950.

8. Burrows, William. Textbook of microbiology, ed. 16. Philadelphia, W. B. Saunders Co., 1954.

9. Knighton, H. T. Comparative bactericidal effects of various temperatures of hot oils. J.A.D.A. 48:307 March 1954.

10. Nolte, W. A., and Arnim, S. S. Sterilization, lubrication and rustproofing of dental instruments and handpieces with a water-oil emulsion: laboratory and clinical study. J.A.D.A. 50:133 Feb. 1955.

11. Neefe, J. R., and others. Disinfection of water containing casuative agent of infectious (epidemic) hepatitis. J.A.M.A. 128:1076 Aug. 11, 1945.

12. Neefe, J. R. Recent advances in knowledge of virus hepatitis. M. Clin. North America 30:1407 Nov. 1946.

13. Capps, R. B. Adequate sterilization prevents transmission of viral hepatitis. Mod. Hosp. 78:45 Jan. 1952.

14. Neefe, J. R. Viral hepatitis: problems and progress. Ann. Int. Med. 31:857 Nov. 1949.

Table 1 • Commonly used methods of instrument disinfection and sterilization utilizing heat

Method	Temperature	Time	Destruction of microorganisms		Indications	Advantages	Disadvantages
			Pathogens, except bacterial spores	Bacterial spores			
Boiling water	100°C.	15 min.	Yes	No	1 Nearly all instruments 2 Syringe and syringe needles 3 Glass and porcelain	1 Reliable 2 Easily carried out 3 Inexpensive	1 Rust and corrosion of metal 2 Not dependable against bacterial spores 3 Unsuited for cotton or fabric material
Dry heat	160°C.	1-2 hours	Yes	Yes	1 Nearly all instruments 2 Syringe and syringe needles 3 Glass and porcelain 4 Anhydrous oils, greases, and powders	1 Destroys all microorganisms 2 Does not cause rust or corrosion	1 Poor penetrating power 2 May damage cotton or fabric material 3 Length of time for sterilization 4 Temperature range must be carefully controlled
Autoclave	121-123°C.	15-20 min.	Yes	Yes	1 Cotton, fabric material, paper, rubber goods, etc. 2 Nearly all instruments 3 Glass and porcelain	Destroys all microorganisms	Rust and corrosion of metal
Hot oils	120-150°C.	10-15 min.	Yes	No	Geared and hinged instruments	1 Prevents rust and corrosion 2 Lubricates instruments	1 Messiness 2 Limitation to metal instruments
	165-185°C.	15 min.	Yes	Yes			
AC 10 (surgical) soda preparation	100°C.	15 min.	Yes	No (in most instances unless time is prolonged)	1 Geared and hinged instruments 2 Nearly all instruments	1 Adequately prevents rust and corrosion 2 Adequately lubricates instruments	1 Film of oil remains on instruments 2 Limitation to metal instruments

Investigation has established rather conclusively that the principal mode, though not the only one, of transmission of viral hepatitis—particularly the homologous serum strain of the disease—has been through the parenteral route by means of contaminated syringes, needles, lancets, surgical instruments, and by blood or blood products.[15-17]

Neefe[14] and Capps,[13] both of whom have made extensive studies of viral hepatitis, hold the view that syringes, needles, lancets, and surgical instruments which come in contact with blood or tissue elements should be cleaned thoroughly and then boiled or autoclaved. It is their belief that if cleansing is thorough, complete immersion of instruments in boiling water for ten minutes should be adequate sterilization.

The use of boiling water has a number of disadvantages. Some of these are that it disinfects rather than sterilizes, that it dulls sharp cutting instruments by rust or corrosion, and that it is unsuited for cotton and fabric material.

Corrosion and rusting of instruments by boiling water can be reduced by the use of distilled water, by the addition of alkalizing salts such as sodium hydroxide, sodium bicarbonate or sodium carbonate, and by the addition of reducing agents such as sodium nitrite to the water.[7,18] Preboiling water for about ten minutes, thoroughly cleaning instruments prior to boiling, and drying instruments while still hot are additional rust-prevention measures.

CATHODIC STERILIZER

Recently, a boiling water cathodic sterilizer has been described which is said to prevent corrosion of sharp or delicate surgical instruments.[19] A battery furnishing about 3 volts of current is required. The negative pole of the battery is attached to the instruments which are to be protected while the positive pole is connected to a piece of metal. Instruments and the piece of metal are then immersed into the boiling water. Because of electrochemical phenomena, corrosion resistance is conferred to the instruments. It is claimed that cataract and keratome knives have been boiled repeatedly by this method for four hours with no perceptible loss of sharpness.

DRY HEAT

Instruments can be sterilized by the use of dry heat. All that is necessary is an oven which will maintain a temperature of 160°C. for not less than one hour.[2,5] It is cautioned that instruments and other materials must be free of debris and oil, otherwise a longer period of time is required for sterilization.[20]

Available data seem to indicate that exposure to dry heat at 160°C. for 60 minutes is approximately equivalent to exposure to moist heat at 121°C. for 10 to 15 minutes.[5]

Because of the heat conducting property of metals and the fact that it does not cause rust or corrosion, dry heat is an excellent method for sterilizing sharp or delicate instruments. Dry heat is also commonly employed for the sterilization of glassware, syringes and syringe needles, and anhydrous oils, greases and powders.

Although small compact dry heat sterilizers suitable for office use are now available, an electric roaster can be used.

There are a number of limitations to the use of dry heat. It does not penetrate readily cotton, fabric material, packaged or wrapped supplies or rubber goods. In addition, many materials are damaged by

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17. Syringe-transmitted hepatitis. J.A.M.A. 139:459 Feb. 12, 1949.

18. Crowell, W. S. Why dental instruments rust and how to prevent it. D. Cosmos 67:752 Aug. 1925.

19. Havener, W. H. A cathodic sterilizer for sharp instruments. J.A.M.A. 157:718 Feb. 26, 1955.

20. Walter, Carl W. Aseptic treamtent of wounds. New York, Macmillan Co., 1948.

the heat. The range of temperature must be controlled carefully; below 160°C. sterilization may not be accomplished, whereas above 160°C. the temper of the metal may be affected or soldered joints loosened. The long period of time needed for sterilization is a disadvantage, particularly in private practice where the number of instruments as a rule is limited.

AUTOCLAVE

Moist heat in the form of saturated steam under pressure is the most effective of the practical methods of destroying microorganisms. The autoclave is standard equipment for sterilization in hospitals. This apparatus makes it possible to elevate the temperature of steam by holding it under pressure. It is heat and not pressure which sterilizes.

The recommended temperature for autoclaving is 121 to 123°C. At this temperature steam has a pressure of 15 to 17 pounds. It has been established experimentally that the most resistant bacterial spores can rarely withstand exposure to saturated steam at 121°C. for more than five minutes whereas no pathogen is able to survive as long as three minutes.[5] In reference to the destruction of the viruses of viral hepatitis, Neefe[14] states that the autoclave is the method of choice.

In the preparation of materials for major surgical procedures, a temperature of 121 to 123°C. for 15 to 20 minutes will provide adequate safety. Articles must be loosely arranged to allow steam to penetrate freely, otherwise the time will have to be extended accordingly.

Cotton, gauze, sponges, towels, rubber gloves and paper points, as well as instruments and glassware, are sterilized readily in the autoclave. After sterilization, cotton and fabric materials contain moisture. They will dry rapidly, however, if left in the hot inner chamber of the autoclave after the door is opened. Compact units excellent for private clinics are now in common use. The only important disadvantage to the autoclave method is that sharp, geared or hinged instruments tend to rust and corrode. The extent of this, however, is considerably less than with boiling water.

HOT OIL METHOD

A method of disinfection especially applicable for geared or hinged instruments is with hot oils. The dental engine handpiece and right angle may be safely disinfected or sterilized by this method. A number of reports on hot oil sterilization have appeared in the literature. As a result of experiments conducted at a naval training center, Parke[21] was able to report that handpieces, after having been used on patients, could be sterilized consistently by immersing them into liquid petrolatum U.S.P. (heavy) for two minutes at a temperature of 250°F. With regard to bacterial spores, he reports that oil at 250°F. is no more effective than boiling water (20 minutes) in destroying such organisms. Appleton[22] reported that the immersion of the engine handpiece in hot oil at 130°C. for five minutes was sufficient to destroy asporogenic bacteria as represented by *Micrococcus pyogenes var. aureus* and *Bacillus coli*. In addition he was able to obtain sterilization of engine handpieces heavily smeared with *Bacillus subtilis* spores by immersing them in hot mineral oil according to the following temperature and time schedule: 180°C. for five minutes, 175°C. for ten minutes, or 165°C. for 15 minutes.

Working with *Actinomyces aerogenes*, *Escherichia coli*, *Streptococcus viridans*, and *M. pyogenes var. aureus* and *var. albus* in partially dry states, Knighton[9] found that hot oil required a temperature higher than 120°C. to destroy completely these organisms within 10 to 15 minutes.

21. Parke, G. L. Sterilization effectiveness of a hot oil bath. J.D. Res. 25:89 April 1946.

22. Appleton, J. L. T. Sterilization of the handpiece. D. Cosmos 66:861 Aug. 1924.

He reports further that they were destroyed both by oil at 150°C. and by boiling water within one minute. It can be concluded, therefore, that under the conditions of this experiment, hot oil at 150°C. is approximately equal to boiling water in effectiveness. Knighton also found that against several species of bacterial spores, hot oil required a temperature of 160°C. to surpass boiling water in rapidity of sporicidal activity. Under similar test conditions, there was little or no difference in bactericidal effectiveness between mineral oils, silicone fluids, and several relatively nonodorous commercial oils.

Experimental results seem to indicate that, provided the temperature is sufficiently high, the hot oil method will destroy all microorganisms, including many of the bacterial spore forms.

Sterilization with hot oil is especially indicated for geared or hinged instruments since the oil in addition will keep parts lubricated and in working order. The big disadvantage to the use of oil is its messiness and limitation to metal instruments. Hypodermic needles and syringes should never be sterilized in oil as an oil embolus may result should any oil be injected accidentally into a blood vessel.

AC 10 (SURGICAL) SODA PREPARATION

A recent variation of oil sterilization is through the use of a special oil and water emulsion. It is claimed the boiling emulsion sterilizes instruments and in addition prevents rusting and corrosion. The first report on the use of this method for surgical instruments was a study in which cataract knives were used as the test instruments.[23]

The sterilizing fluid is described as consisting of a 2 per cent (weight in volume) solution of sodium carbonate decahydrate in an emulsion of oil, 2 per cent (by volume) in water. According to the report, AC 10 (surgical) is a special kind of light petroleum oil. In a series of tests, it was shown that cataract knives contaminated with several species of bacteria, including *Bacillus subtilis* (with spores), could be sterilized by boiling in this oil and water preparation for five minutes. The emulsion can be boiled in an ordinary water sterilizer. The report states that by the use of AC 10 (surgical), the serious problem of rusting and corrosion of sharp-edged ophthalmic instruments can be prevented, and that the boiling emulsion is highly effective in sterilizing as well.

In a report appearing two years later,[24] the use of AC 10 (surgical) soda preparation for the sterilization of the dental engine handpiece was described. Results of this investigation demonstrated that handpieces contaminated with a streptococcus organism could be sterilized by placing into a bath of boiling AC 10 (surgical) soda preparation for five minutes. When *B. subtilis* was used as the contaminant, 30 minutes or longer was required for sterilization. This report gave evidence that, if used according to directions, the emulsion also adequately prevents rusting and corrosion of handpieces.

Thompson[25] studied the AC 10 (surgical) soda preparation using surgical blades contaminated with a culture of (1) hemolytic staphylococci, (2) a mixture of hay infusion (containing aerobic sporulating organisms), and (3) human saliva. He was able to obtain sterilization of all blades within ten minutes by boiling in the oil emulsion. A high degree of protection against corrosion was reported.

Nolte and Arnim[10] in 1955 conducted a critical study to ascertain the effectiveness of AC 10 (surgical) soda prepara-

23. Foster, J.; LeMay, C. H., and Johnston, K. I. Corrosion of sharp-edged ophthalmic instruments. Proc. Roy. Soc. Med. 38:465 June 1945.

24. Harvey, W.; LeMay, C. H., and Shuttleworth, C. W. Sterilization of dental handpieces. Proc. Roy. Soc. Med. 40:507 July 1947.

25. Thompson, Henry. Sterilization of sharp instruments using a boiling emulsion of AC-10. J. Canad. D.A. 20:499 Sept. 1954.

tion as described by Foster and coworkers.[23] Dental burs, scalpels and engine handpieces were inoculated with six types of bacterial cultures, one of which was a culture of *B. subtilis* with spores. All inocula tested except *B. subtilis* were killed by a five minute exposure in the boiling oil emulsion. They also found that its use satisfactorily prevented rust, but did not do this completely. Handpieces exposed to the boiling emulsion for as many as 43 sterilization periods continued to operate smoothly. Nolte and Arnim are of the opinion that the emulsion is a satisfactory lubricant, but that it is not foolproof under the conditions of their study. Their conclusion is that when properly used, the boiling emulsion is an effective and inexpensive means for sterilizing, lubricating and rustproofing most dental instruments.

The various tests that have been conducted appear to indicate that the AC 10 (surgical) soda preparation is better, or at minimum equal to, boiling water in effectively destroying microorganisms. In addition it rustproofs and lubricates instruments. Although a slight oil film remains after disinfection or sterilization, it is not too objectionable and can be wiped off for the most part with gauze or a towel. The special oil preparation and tablets of sodium carbonate which are to be used with it are known under the brand name AC 10 Dental Fluid and Midwest Sodium Carbonate Tablets (Midwest Dental Manufacturing Co., Chicago).

SPECIAL METHODS OF STERILIZATION USING HEAT

Two additional methods of sterilizing instruments which employ heat are flaming and use of the molten metal sterilizer (Table 2). These are special methods of sterilization sometimes used with certain types of instruments, under conditions which are unusual, or when a single instrument needs to be sterilized quickly.

FLAMING OF INSTRUMENTS

Flaming of instruments is an expedient method of instrument sterilization of particular value in emergency situations. There are two ways in which this is done:

1. An instrument is held over a flame until it becomes very hot. This results in the incineration of all microorganisms, but unfortunately also damages the finish and alters the temper of the metal.

2. The instrument is dipped into alcohol or some other inflammable liquid and then ignited. Although the latter method usually does not harm the instrument, the microbicidal effectiveness of such a procedure is open to serious question.[4]

Sanderson[26] was able to show that glass rods contaminated with five different species of nonsporing bacteria could be sterilized by dipping into methyl alcohol and then igniting. This proved ineffective, however, when bacterial spores were used as contaminants. He found that a methyl alcohol-Formalin mixture (3:1) after ignition gave excellent sporicidal results except in the case of anaerobic spores, probably because grease and oil were also present.

Findings similar to those obtained by Sanderson are reported by Bartels and Rice.[27] The latter contaminated small iron screws with *B. subtilis*, momentarily immersed them in a mixture of Formalin (40 per cent formaldehyde) and three parts of 95 per cent alcohol, and ignited the fluid adhering to the screws. Bacteriological cultures showed this method to be 95 per cent effective.

Grossman and Appleton[28] conducted a series of laboratory and clinical tests to determine the bactericidal effectiveness of alcohol flaming. In the first series of

26. Sanderson, E. S. Sterilization of surgical instruments. J. Lab. & Clin. Med. 7:360 March 1922.

27. Bartels, H. A., and Rice, E. Bacteriologic evaluation of some simple sterilizing methods. J.A.D.A. 29:1398 Aug. 1942.

28. Grossman, L. I., and Appleton, J. L. T. Resterilization of dental instruments by use of alcohol and flaming. J.A.D.A. 27:1632 Oct. 1940.

Table 2 • Special methods of instrument disinfection and sterilization

Method	Temperature	Time	Destruction of microorganisms		Indication	Advantages	Disadvantages
			Pathogens, except bacterial spores	Bacterial spores			
Flaming of instruments with the use of:					1 Expedient method in emergency or unusual situations 2 Re-establishing sterility of instruments during use	Rapid in emergency situations	1 Limited to one or a few instruments at a time 2 Results may not be consistently uniform
1 Alcohol	?	Seconds ?	Yes, in most instances	No			
2 Alcohol-Formalin mixtures	?	Seconds ?	Yes	Yes, in many instances			
Molten metal sterilizer	168-179°C.	About 10 seconds	Yes	No	Specialized instruments, i.e., root canal instruments	Rapid	1 Use limited to special type instruments (root canal) 2 Temper of metal may become altered 3 Paper points become dry and brittle
	180-300°C.	5-10 seconds	Yes	Yes, in many instances			
Ultraviolet light	—	Prolonged (hours)	Questionable	No	None for instruments	None (instruments)	1 Prolonged time 2 Not reliable for instrument disinfection

tests, the working end of dental instruments was contaminated with saliva, dried, dipped into alcohol and flamed, and dipped into alcohol and flamed a second time. Upon culture, 92 per cent of the treated instruments failed to produce growth. Although five different alcohols were tried, none were significantly superior to the others. In the second series of tests, instruments being used by dental students in the course of root canal treatments were collected and treated in the same manner as those in the first series except that only one alcohol (denatured 70 per cent) was used. Upon culture, 88 per cent of the instruments failed to produce growth. The report concludes by cautioning that though flaming as described may be used for re-establishing sterility during use of instruments, it is not a recommended method for primary sterilization of dental instruments.

MOLTEN METAL STERILIZER

The molten metal method of sterilizing utilizes a metal cup containing low fusing alloy which melts at about 360 to 380°F. Once the alloy is in the molten state, just enough heat is supplied to maintain that state. Heat may be furnished by an electrical heating element, an alcohol lamp, or a Bunsen burner. Grossman[29] recommends the molten metal sterilizer as a method of sterilizing absorbent points and small root canal instruments immediately before use. He states that such instruments may be sterilized in ten seconds by this manner. The disadvantage in the use of the molten metal sterilizer is that absorbent points tend to become excessively dry and brittle, and that the temper of fine instruments may be altered if held in the sterilizer too long. The slag which often forms on the surface of the molten metal tends to adhere to instruments and is a source of annoyance.

Bartels and Rice[27] found the bactericidal efficiency of the molten metal sterilizer used in their tests to be 91.2 per cent effective in destroying *B. subtilis* spores. In this investigation small iron screws were immersed in suspensions containing the spores, dried, and then submerged in the molten metal for periods of 5 to 10 seconds. Various temperatures ranging between 180°C. and 300°C. were used. A recent modification of the molten metal sterilizer consists in substituting small glass beads for molten metal. Although the use of glass beads eliminates the problem of slag, other disadvantages have appeared.

ULTRAVIOLET LIGHT

The bactericidal properties of ultraviolet light have been successfully utilized. Modern ultraviolet lamps, highly effective in destroying bacteria suspended in the atmosphere, are being used increasingly and can do much to prevent transmission of infection in hospital nurseries, wards and operating rooms, and in places of assemblage, such as schoolrooms.[4]

Ultraviolet radiation has been suggested for instrument sterilization (Table 2). Sterilizers delivering ultraviolet light designed for use in the dental office are available. These have not proved to be either too effective or too reliable for the sterilization of dental instruments.[30, 31]

There are a number of serious limitations to the use of ultraviolet light for disinfecting instruments.[4] Only surfaces directly exposed are disinfected, crevices or debris are not penetrated, and a considerable length of time is necessary if sterilization is to be accomplished.

CHEMICAL GERMICIDES

Microorganisms can be destroyed by a number of chemical compounds. Solu-

29. Grossman, L. I. Root canal therapy, ed. 3. Philadelphia, Lea & Febiger, 1950.

30. Hamilton, W. S. Ultraviolet sterilization of instruments. J. Canad. D.A. 7:124 March 1941.

31. Burket, L. W. Bactericidal action of ultraviolet radiation on oral flora and its effectiveness on dental bur sterilization. Am.J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 30:533 Sept. 1944.

tions of alkalies, acids, phenol, cresol, formaldehyde, although germicidal in appropriate concentrations, usually possess undesirable qualities. They often injure instruments, equipment and surgical supplies or have irritating and other toxic effects. Most such solutions are therefore impractical to use as general disinfectants.

During recent years a number of chemical solutions have been developed which are broadly germicidal, harmless to instruments and materials, and safe to use. Although these solutions have solved the factor of safety, they are disinfectants rather than sterilizing agents. In addition to being unable to destroy bacterial spores, most are also ineffective against the more resistant organisms, such as tubercle bacilli.

In view of the hardiness of the causative agents of viral hepatitis, it can also be assumed that the newer chemical disinfectants do not protect adequately against this disease. It is good practice, therefore, not to use chemical disinfectants for the disinfection of syringes, needles, lancets, extraction instruments, and any other surgical instruments which come into direct contact with blood or which enter tissues. The treatment of such instruments for complete safety demands boiling water or better, the autoclave.

As with other methods, the efficiency of these solutions is greatly reduced under careless use. For example, small amounts of blood, saliva, pus, organic debris, and soap left on instruments usually materially lowers germicidal activity. Manufacturers' claims of germicidal powers have in some instances been misleading in that tests reported were conducted under conditions most favorable to their product. Nevertheless progress has been made. Reliable firms today clearly state limitations of their product and give detailed directions for use.

The newer disinfectants fall into four chemical classes: formaldehyde preparations, mercury preparations, phenolic compounds and quaternary ammonium compounds (Table 3).

FORMALDEHYDE PREPARATIONS

A 3 to 8 per cent aqueous solution of formaldehyde is actively germicidal in the presence of organic matter.[4] Aqueous formaldehyde solutions, however, are too irritating and toxic for general use as disinfectants. Because of their excellent germicidal properties, attempts have been made to reduce the irritating and toxic qualities of formaldehyde by combining it with various other agents.

Blass and Styron[32] reported on a solution containing formaldehyde, rubbing alcohol and sodium borate for chemical sterilization of instruments. They caution that although their studies show such an alcoholic solution of formaldehyde to be effectively bactericidal, many conditions must be taken into account before final conclusions can be reached.

Tainter and co-workers[33] developed an alkalized alcoholic solution of formaldehyde which possesses high germicidal value and can be used for the sterilization of instruments. The formula consists of formaldehyde dissolved in isopropyl alcohol and certain other agents to mask the odor and to prevent rust and corrosion. As a result of their experiments they conclude that common pyogenic organisms are killed by this mixture probably within one minute, while the most resistant of the spores tested are killed in less than five hours. They imply that the odor of formaldehyde in the disinfectant is not completely disguised. Mention is also made that frequent contact of the skin with this solution is liable to result in dermatitis.

Spaulding[34] made a study of the germicidal effect of seven solutions often used

32. Blass, J. L., and Styron, N. C. Bactericidal action of an alcoholic solution of formaldehyde and sodium borate. J.A.D.A. 28:2047 Dec. 1941.

33. Tainter, M. L., and others. Chemical sterilization of instruments. J.A.D.A. 31:479 April 1944.

Table 3 • Chemical solutions in current use for disinfecting instruments

Chemical classification of disinfectant	Compound generally used (active agent)	Concentration generally recommended (% refers to amt. of active compound)		Time	Destruction of microorganisms				Indications	Advantages	Disadvantages
					Usual pathogens	Mycobacterium tuberculosis	Viruses of viral hepatitis	Bacterial spores			
Formaldehyde preparations	Formaldehyde	3-12%	Aqueous or Aqueous-alcoholic solutions	20-30 min.	Yes	Probably yes under favorable conditions and adequate concentration	No (?)	No (Prolonged contact may destroy some bacterial spores)		1 Simplicity 2 Convenience	1 Odor of formaldehyde 2 Tendency to give rise to dermatological irritations 3 Not dependable against bacterial spores and probably viral hepatitis organisms
Organic mercury preparations	Nitromersol	0.04%	Aqueous-alcoholic solutions	20-30 min.	Yes	No	No (?)	No	Instruments (Except those coming into direct contact with blood or which enter tissues)	1 Simplicity 2 Convenience 3 Noninjurious	1 Not dependable against acid-fast bacteria and viral hepatitis organisms 2 Ineffective against bacterial spores 3 Must make direct contact with organisms
	Phenylmercuric borate	0.75%									
Phenolic compounds	Hexachlorophene	1%	Aqueous-alcoholic solutions	20-30 min.	Yes	No	No (?)	No			
Quaternary ammonium compounds	Benzalkonium chloride	0.1-0.5%		20-30 min.	Yes	No (aqueous solutions)	No (?)	No	1 Instruments (except those coming into direct contact with blood or which enter tissues) 2 Surgical equipment 3 Disinfection of hands		
	Benzethonium chloride	0.1%	Usually aqueous solutions								
	Methylbenzethonium chloride	0.1%									
	Cetyl dimethyl ethyl ammonium bromide	0.25%									

as disinfectants. He used detachable knife blades contaminated with eight different species of bacteria, three of which were spore formers. Results obtained showed that whereas vegetative bacteria were readily destroyed by all the solutions, only the two which contained formaldehyde were able to destroy all three types of spores within 18 hours.

The principal disadvantages to formaldehyde solutions are irritating fumes, coagulation of proteins and tendency to produce dermatological conditions.

None of the various combinations of formaldehyde which have been used have been able to eliminate entirely these undesirable qualities.

MERCURY PREPARATIONS

Simple inorganic mercuric salts have disinfecting properties but in general are toxic, irritating to skin, cause precipitation of protein matter, and corrode metals. In addition, their bactericidal effectiveness is diminished by the presence of serum, and they do not destroy bacterial spores.[35]

Organic mercurials were developed in an attempt to eliminate some of the undesirable qualities of the inorganic forms. They first appeared on the market at the close of World War I. As a group the organic mercurials are less toxic, less irritating, less corrosive, and are less affected by the presence of organic matter than are the inorganic salts of mercury.[35] Unfortunately, organic mercurials are also ineffective against bacterial spores, although they may exert a bacteriostatic effect toward them.

The literature on the use of mercurial compounds as disinfectants is somewhat confused and conflicting. Brewer[35] gives an excellent survey and analysis of this group.

Organic mercury compounds are in current use as antiseptics and disinfectants. Two which are widely used in disinfecting solutions are nitromersol, N.F., and phenylmercuric borate.[36]

PHENOLIC COMPOUNDS

The popularity which phenol (carbolic acid) enjoyed at one time as a germicidal agent has noticeably declined. Phenol has been largely replaced by other chemical agents which are better disinfectants and less toxic. Nevertheless, it is still in use as a disinfectant, particularly where there is no objection to toxicity, tissue damage or odor.

McCulloch[4] states that most of the common bacteria are killed by exposure to phenol in 1:80 or 1:100 dilutions at a temperature of about 68°F. He also states that spores of *Bacillus anthrax* are able to survive 24 hours of exposure to 5 per cent phenol and that most viruses show resistance to phenol.

Many derivatives of phenol are used as antiseptics and disinfectants. These are known as phenolic compounds. The two most commonly used for purposes of disinfection are cresol and hexachlorophene.

Officially, cresol is a mixture of the three isomers, ortho-, meta- and paracresol. Cresol, while about four times as germicidal as phenol, is slightly less toxic. It nevertheless is an active poison with properties similar to phenol. The common pathogenic organisms are destroyed by a 1:150 to 1:300 dilution of cresol in ten minutes.[4] Cresol is not sporicidal and has limited value against the viruses.[37] One important advantage to cresol is that organic matter in moderate amounts does not interfere with germicidal activity.

34. Spaulding, E. H. Studies on chemical sterilization of surgical instruments. I. Bacteriological evaluation. Surg., Gynec. & Obst. 69:738 Dec. 1939.

35. Brewer, J. H. Mercurials—organic and inorganic. In Antiseptics, disinfectants, fungicides, and chemical and physical sterilization, Reddish, G.F., editor. Philadelphia, Lea & Febiger, 1954.

36. American Dental Association, Council on Dental Therapeutics. Accepted dental remedies, ed. 22. Chicago, American Dental Association, 1957.

37. American Medical Association, Council on Pharmacy and Chemistry. New and nonofficial remedies. Philadelphia, J. B. Lippincott Co., 1954.

Cresol is only moderately soluble in water, about 1:50. It readily forms an emulsion with soap and water. Compound cresol solution, N.F., which contains about 50 per cent of cresol is such an emulsion.[36] This solution is widely used as a disinfectant, particularly where cleansing action is also desirable. In a 3 to 5 per cent solution, it may be used as a disinfectant for instruments.

Hexachlorophene, a diphenol, is one of the newer phenolic compounds. It is used in a 1 per cent solution for disinfecting dental instruments.[36] Evidence has not yet been presented of its activity against acid-fast bacteria, fungi, bacterial spores, viruses or spirochetes.[37] As used in disinfecting solutions, hexachlorophene has proved to be relatively nontoxic and nonirritating.

QUATERNARY AMMONIUM COMPOUNDS

A quaternary ammonium compound is one in which four of the valences of ammonia nitrogen are saturated with organic radicals.[36]

The quaternary ammonium compounds have been in use as distinfectants only within the last 20 years.[38] Lawrence[39] gives an excellent review and analysis of the extensive literature on this group of compounds. The wide and popular acceptance of quaternary ammonium compounds as disinfectants is due to the many desirable properties they possess. They are remarkably effective as germicides (except against bacterial spores and tubercle bacilli), are nontoxic and nonirritating in effective concentrations, have good detergent qualities, are colorless and highly stable, do not rust or corrode instruments on addition of antirust agents to their solutions (except aluminum instruments), and are nonvolatile and unaffected by boiling or autoclaving.

Tests which have been conducted with aqueous solutions of quaternary ammonium compounds indicate poor bactericidal action against tubercle bacilli.[40,41] Lawrence and Grover[41] report, however, that benzalkonium germicidal solution, the active components of which are isoproponal, methanol, formaldehyde, alkyldimethylbenzylammonium chloride and sodium nitrite, is highly effective in destroying both oral microorganisms and tubercle bacilli. As a result of their findings, this solution has been adopted for use by the University of Michigan Hospital operating rooms.

The quaternary ammonium salts are cationic surface-agents. At least part of their bactericidal activity is due to their ability to lower surface tension.[42]

Benzalkonium chloride U.S.P. (Zephiran) is probably the most widely used member of this group of compounds. It and other quaternary ammonium compounds are used in aqueous or tincture solutions as antimicrobial agents. They are effectively and widely used for the disinfection of surgical instruments and operating room equipment, the preoperative disinfection of skin, as a soak for the surgeon's hands and arms, as irrigating and lavage solutions for the genitourinary tract, in dermatology for fungus infections, for treating open infections or applying wet dressings, and for irrigating the eye, ear, nose or throat.

Accepted Dental Remedies[36] states that the quaternary ammonium salts are subject to much the same limitations with regard to bactericidal effectiveness as are various preparations of formaldehyde, mercury and phenol.

As a group the quaternary ammonium

38. Domagk, G. Eine neue Klasse von Desinfektionsmitteln. Deut. med. Wschr. 61:829, 1935.

39. Lawrence, C. A. Quaternary ammonium compounds. In Antiseptics, disinfectants, fungicides, and chemical and physical sterilization, Reddish, G.F., editor. Philadelphia, Lea & Febiger, 1954.

40. Smith, C. R., and others. Bactericidal effects of surface active agents on tubercle bacilli. Pub. Health Rep. 65:1588 Dec. 1, 1950.

41. Lawrence, C. A., and Grover, A. A. Hospital sterilizing solutions. Bull. Am. Soc. Hosp. Pharmacists 8:224, 1951.

42. Remington, J. P. Practice of pharmacy: a treatise. Cook, E., and Martin, E. W., editors, ed. 10. Easton, Pa., Mack Publishing Co., 1951.

compounds are incompatible with soap, some of the heavy metals, anionic agents, and certain water mineral substances.[39]

The more commonly used quaternary disinfecting solutions currently on the market are listed in *Accepted Dental Remedies*.[36]

LIMITATIONS OF NEWER DISINFECTANTS

All of the newer chemical disinfecting solutions now on the market are relatively safe to use and are noninjurious to instruments or surgical material. Although they are effective against the usual pathogenic microorganisms, they do not destroy bacterial spores nor, generally, tubercle bacilli. They are also very probably ineffective against the viruses of viral hepatitis. When used for the disinfection of instruments certain precautions should be observed:

1. Directions for use including recommended time should be followed.
2. When resistant microorganisms such as bacterial spores, tubercle bacilli, or the viruses of viral hepatitis are suspected, disinfecting solutions should not be relied upon.
3. Disinfecting solutions should not be used for instruments which are hinged, corroded, or have narrow crevices, for hypodermic needles, or for instruments which come in direct contact with blood or which enter tissues.
4. Thorough scrubbing with soap and water followed by thorough rinsing with water should precede immersion in disinfecting solutions.

THE ALCOHOLS

A review of disinfectants is not complete unless some mention is made of the chemical group known as alcohols. Use of ethyl alcohol as a disinfecting solution is a time honored practice. More recently, isopropyl alcohol, which possesses much the same physical properties as ethyl alcohol but seems to have slightly better germicidal activity, has to some extent replaced ethyl alcohol.[43] The use of methyl alcohol as a disinfectant is not justified since it is the weakest bactericidal member of this group.[44] Although most alcohols possess bactericidal properties, only ethyl and isopropyl alcohols have been widely used as disinfectants (Table 4).

ETHYL ALCOHOL

The term "alcohol," loosely used, refers to ethyl alcohol. Ethyl alcohol has been used extensively for disinfecting instruments and for disinfecting skin prior to venipuncture, finger pricks for blood counts, and parenteral injections. In general, 50 to 70 per cent aqueous solutions of ethyl alcohol are recommended as being the best concentrations for germicidal activity. Concentrations below 20 per cent and above 95 per cent are said to be unreliable.[45]

The literature on the value of ethyl alcohol as a germicide is extensive. The greater number of early reports as well as most textbooks on bacteriology and pharmacology favor the view that alcohol possesses poor disinfecting qualities. Many of the more recent studies and critical reviews, however, have shown that aqueous solutions of alcohol in optimum concentrations are highly effective as disinfectants.[34, 44, 46-51]

43. Giarmon, V. A. Chemotherapy of bacterial infections. I. Antiseptics and germicides. In Pharmacology in medicine—a collaborative textbook. Drill, V. A., editor. New York, McGraw-Hill Book Co., Inc., 1954.

44. Morton, H. E. Alcohols. In Antiseptics, disinfectants, fungicides, and chemical and physical sterilization, Reddish, G. F., editor. Philadelphia, Lea & Febiger, 1954.

45. Hulpieu, H. R., and Harger, R. N. The alcohols. In Pharmacology in medicine—a collaborative textbook, Drill, V. A., editor. New York, McGraw-Hill Book Co., 1954.

46. Morton, H. E. Relationship of concentration and germicidal efficiency of ethyl alcohol. Ann. New York Acad. Sc. 53:191 Aug. 30, 1950.

47. Price, P. B. Ethyl alcohol as a germicide. Arch. Surg. 38:528 March 1939.

48. Price, P. B. Reevaluation of ethyl alcohol as a germicide. Arch. Surg. 60:492 March 1950.

Table 4 • Ethyl and isopropyl alcohols as disinfectants

Alcohol	Recommended concentration (aqueous)	Time	Usual pathogens	Destruction of microorganisms			Indications	Advantages	Disadvantages
				Mycobacterium tuberculosis	Viruses of viral hepatitis	Bacterial spores			
Ethyl alcohol	50 to 70% solutions	15-20 min.	Yes	Yes	No (?)	No	Instruments (except those coming into direct contact with blood or which enter tissues)	1 Simplicity 2 Convenience 3 Cleansing action 4 Rapid evaporation from instruments 5 Colorless	1 Ineffective against bacterial spores and probably viral hepatitis organisms 2 Legal restrictions 3 Heavy taxation 4 Prolonged contact of aqueous solutions with metal will cause rusting 5 Narrow effective concentration range which may be easily disturbed by dilution
Isopropyl alcohol	30 to 80% solutions	15-20 min.	Yes	Yes	No (?)	No			1 Ineffective against bacterial spores and probably viral hepatitis organisms 2 Prolonged contact of aqueous solutions with metal will cause rusting 3 Narrow effective concentration range which may be easily disturbed by dilution

The major weakness of ethyl alcohol as a germicide lies in its ineffectiveness against bacterial spores. Various workers have demonstrated that both ethyl and isopropyl alcohol possess poor killing capacity against bacterial spores.[33, 34, 44, 52] Fatal gas gangrene infections attributed to the use of surgical instruments inadvertently contaminated with bacterial spores and disinfected with alcohol are on record.[53]

ISOPROPYL ALCOHOL

Isopropyl alcohol offers some advantages over ethyl alcohol as a disinfectant. It is less volatile, possesses slightly greater germicidal action, and has a wider range of concentration effectiveness. Giarmon[43] states that the effective aqueous solution concentration range is from a 30 to 90 per cent at 20°C.

After reviewing the literature, Grant[54] concluded that isopropyl alcohol possesses greater antiseptic and batericidal capacity than ethyl alcohol, although it is somewhat more toxic. It is his opinion that of the aqueous solutions, concentrations of 30 to 50 per cent are the most effective.

VOLATILE GERMICIDES

Volatile germicides in the form of gases, vapors and fumes, although primarily used for other types of disinfection, have been used for the sterilization of instruments and surgical materials. In general these have been found to be unreliable and of little practical value for this purpose. The procedure consists in placing instruments or other material for various periods of time in an air-tight case in which the gaseous germicide is liberated or generated. Formaldehyde gas, probably the most effective member of this group, has been rather widely used for this purpose.

Formaldehyde gas is effective only under certain conditions: humidity must be high, the temperature must be maintained at 90°F. or above, the gas atmosphere in the sterilizing chamber must be nearly saturated, instruments must be clean, and the exposure time must be prolonged.[4, 55] McCulloch[4] points out that some of these conditions also lead to rapid rusting of instruments.

In reference to root canal instruments, Grossman[29] states that since bacteria adhering to the instruments are generally in a dry state, formaldehyde gas cannot be depended upon to exert any bactericidal effect.

REMARKS

It must be emphasized that although the methods of destroying microorganisms are many, there is no single method which can be used to the exclusion of all others. The method selected in any situation is determined by considering what is to be done, the most effective way of doing it, and the end result. Such an analysis makes it evident that generally several methods of disinfection and sterilization must be employed.

Dirty or unscrubbed hands, soiled bracket tray or table tops, and frequently handled and therefore easily contaminated parts of dental, medical and other equipment also can be sources of disease-producing microorganisms. That they should be frequently and thoroughly scrubbed with soap and water, followed

49. Force, J. N., and Kerr, W. Efficient disinfection of hospital clinical thermometers. Mod. Hosp. 15:156, 1920.

50. Gershenfeld, L.; Greene, A., and Witlin, B. Disinfection of clinical thermometers. J.Am. Pharm. Assn. (scient. ed.) 40:457 Sept. 1951.

51. Smith, C. R. Alcohol as a disinfectant against tubercle bacillus. Pub. Health Rep. 62:1285 Sept. 5, 1947.

52. Powell, H. M. Antiseptic properties of isopropyl alcohol in relation to cold sterilization. J. Indiana M.A. 38:303 Sept. 1945.

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whenever possible by disinfection, are cardinal rules to follow.

SUMMARY

1. The objective of sterilization and also of disinfection is the destruction of microorganisms which are or which possess pathogenic potential. Although there are many methods of doing this, it is important to select the most appropriate method in any situation.

2. The microorganisms of medical interest are bacteria, fungi (yeasts and molds), rickettsiae and protozoa. The viruses, although unlike microorganisms in some respects, are nevertheless included with them. Each group has members pathogenic to man.

3. Bacterial spores are the most difficult microorganisms to destroy. Because of this, proof of sporicidal effectiveness is evidence of capacity to kill all microorganisms.

4. Most terms relating to infection and to destruction of microorganisms have undergone changes in meaning. Since scientific terms must connote exact meaning, a standard terminology in this field is highly essential.

5. Heat is the most reliable, least expensive, and the most easily carried out of the practical methods of disinfection as well as of sterilization.

6. The various methods of disinfection and of sterilization which utilize heat are boiling water, dry heat, heat in the form of saturated steam under pressure, hot oils, a special oil and water emulsion, flaming, and the molten metal sterilizer. Each method has its advantages and disadvantages. The autoclave method is probably the most nearly perfect of the methods which sterilize.

7. Ultraviolet light sterilizers for either disinfection or sterilization of instruments and surgical materials have too many limitations to be of practical value.

8. It is well to remember that sources of infection other than contaminated instruments exist.

9. Although the newer chemical disinfectants have solved the factor of safety, they do not destroy bacterial spores nor the more resistant nonspore forms such as the tubercle bacilli. They are also probably ineffective against the viruses of viral hepatitis.

10. The newer disinfectants fall into four chemical classes: formaldehyde preparations, mercury preparations, phenolic compounds and quaternary ammonium compounds.

11. Although most alcohols possess bactericidal properties, ethyl and isopropyl alcohol are the only two which have been widely used as disinfectants. Of the two, isopropyl alcohol seems to be the better germicide.

12. Both ethyl and isopropyl alcohol are ineffective against bacterial spores.

13. Volatile germicides in the form of gases, vapors and fumes have proved unreliable and of little practical value in the disinfection and sterilization of instruments and surgical materials.

Man's Weaknesses • The human forebrain, in which man surpasses all other species of animals, has not yet acquired complete control of the part of the brain which man has in common with the snake, the hyena, the tiger, and the goat. *Anton J. Carlson.*

Specialties in dentistry with special reference to oral surgery

Leslie M. FitzGerald, D.D.S., D.Sc., Dubuque, Iowa

Many persons today look askance at the increasing tendency toward specialization, particularly in the health professions. The patient grows more and more unhappy as he is shuttled from specialist to specialist without getting a good picture of what is wrong with him or a notion of how to set it right. I see more and more evidence of an attempt by some specialties to drift away from the influence and policies of the total dental profession and to live in their own brave, new isolated world. I recognize the danger of refining the standards of specialties so thoroughly that there is a barrier for the many and protection for the few. I know that some groups aim at the name rather than the nature of a specialty, at the prestige rather than the performance.

All of these things are true, or soon may be, in whole or in part. But I also know that specialties in dentistry are here to stay. They are a part of modern dental practice and, though the trend may be controlled somewhat, it will never be reversed.

There should be little need to document the foregoing assertions, for the social growth of almost any kind of community tends to create smaller groups devoted to more effective work in a smaller area of activity. The old time carpenter is gone, and in his place there is the efficient nailer of boards; the old time engineer is gone and today there is the chemical, the electrical, the thermodynamic, the atomic, the civil and the military engineer. The general practitioner in medicine who was all things to all people seems to be disappearing into the school or hospital or health center or group practice. This may not be good evolution, but it is still evolution, and there is no reason to believe that dentistry will stay out of the mainstream of such change, whether it is willing or not.

In medicine, of course, the specialties developed at a much earlier date than in dentistry. The American Board for Ophthalmic Examinations, now the American Board of Ophthalmology, was the first medical specialty board and was founded in 1917. Three more medical boards were developed by 1933: otolaryngology; obstetrics and gynecology; and dermatology and syphilology. Thus, the whole development of specialties in the health professions is, by most standards, a fairly recent development.

The oldest medical specialty board is 39 years old. Although maturity is expected from persons aged 39, if those who now look back on life from the viewpoint of 60 consider this matter, I am sure they will think they were very youthful and, occasionally, very foolish at the age of 39. So it must be remembered that some of the problems in specialties today are problems of growth and development, and not of stunted growth and failure.

In dentistry, specialties are even more youthful than they are in medicine. In 1928, the American Society of Oral Surgeons appointed a committee to "formulate standards for specialty practice," the date on which the trend toward specialism in dentistry began. In 1932 the same society appointed another committee as-

Secretary, the American Board of Oral Surgery.

signed "to formulate plans for a national board" and, in 1936, the two committees dealing with aspects of specialty practice were combined.

As a result of their deliberations, the American Society of Oral Surgeons created a National Board of Examiners in 1940. World War II then intervened, and it is interesting to note that although the war delayed the development of specialties in dentistry, it gave them a tremendous impetus in another way.

In 1945, the American Society of Oral Surgeons authorized the formation of an American Board of Oral Surgery to conduct examinations for the certification of specialists in the field of oral surgery. This Board was incorporated under the laws of the state of Illinois. Requirements for qualification for the examination of the Board were also established at this time.

It was at this point that a very strong, new influence was brought to bear on the development of specialties in dentistry, and this influence has been good in an extraordinarily pertinent sense. The newly organized American Board of Oral Surgery recognized at once that it stood alone and that it should not. Accordingly it petitioned the House of Delegates of the American Dental Association to direct the Council on Dental Education to develop general standards and requirements through which recognized specialty boards could be established in the profession of dentistry.

The House of Delegates thought well of this proposal and approved the resolution. As a result, the American Board of Oral Surgery was established in 1946 as the first recognized specialty board in dentistry. This event has great significance, for it pioneered the development of a strong and permanent relation between the specialties and the representative body of the dental profession.

The need for specialty boards has been demonstrated by their acceptance. According to the records of the Council on Dental Education as of December 1, 1956, there were 1,436 diplomates of the seven recognized boards, distributed as follows: American Board of Dental Public Health, 29; American Board of Oral Pathology, 37; American Board of Oral Surgery, 358; American Board of Orthodontics, 531; American Board of Pedodontics, 63; American Board of Periodontics, 227; American Board of Prosthodontics, 191.

The present procedure for certification by the American Board of Oral surgery is as follows: On receipt of an inquiry at the office of the secretary of the Board, application forms in duplicate, an information pamphlet and other informative literature are mailed to the applicant. An accompanying letter explains that the requirements should be read carefully and be thoroughly understood before the application is filed.

The secretary, on receiving the completed applications in duplicate, immediately forwards one copy to the chairman of the credentials committee for investigation and recommendation. It is necessary that the credentials committee report favorably on an applicant before his application can be approved or before he can be assigned a date for the written examination. The credentials committee actively investigates the character, training and professional standing of each applicant.

This investigation is made through various channels such as confidential reports from individuals acquainted with the applicant, educational institutions and organizations, some of which may have been indicated in his application, diplomates of the Board, and any other source from which the credentials committee feels authentic information can be secured. All such information regarding an applicant is held in strict confidence, and records of the sources are destroyed immediately.

After approval of the applicant by the credentials committee, he is invited to appear for the written examination which will be given in the geographical area of

the candidate. The questions basically cover the biological sciences as they relate to oral surgery.

After the candidate has passed the written examination, he is then eligible for the oral examination which is usually given in Chicago.

The examining committee at the present time consists of members of the Board and the advisory committee, each of whom is assigned a subject by the chairman of the examining committee. The subjects and questions cover all phases of oral surgery. Past examinations have included history taking and diagnosis; anesthesia; roentgenographic interpretation (numerous roentgenograms are shown for the applicant's interpretation); surgical anatomy; surgical technic; pathology; preoperative and postoperative treatment; hospital routine; interpretation of laboratory findings and reports; and questioning on other phases of the various subjects.

The applicant is graded by each examiner separately in a written ballot. Grades are recorded by the chairman of the examining committee, the final decision as to acceptance or rejection being based on the grades given by each examiner. The examinations committee also has the privilege of visiting the applicant in his office or hospital to observe actual operations on patients, should such procedure seem desirable.

The American Board of Oral Surgery established minimal standards for graduate training, effective October 1, 1952. Formal advanced training in oral surgery for three years in a recognized graduate school or hospital approved by the Council on Dental Education of the American Dental Association is a basic requirement. This period of training should cover two years of clinical and technical phases of oral surgery and the equivalent of 30 semester hours of advanced study in the biological sciences as they are related to oral surgery as well as hospital routine and organization.

The applicant will be required to have devoted at least five years exclusively to the practice of oral surgery. The time spent in graduate training may be included. This requirement is based on the belief that a dentist who does not limit his practice to oral surgery should not be certified as a specialist. The American Board of Oral Surgery concurs in the recommendation of the Council on Dental Education that the policy of determining the limitation of practice of a specialist shall rest entirely on the individual professional group and its specialty Board.

Any practitioner who graduated from an approved dental school in 1946 or prior thereto, whose practice has been devoted exclusively to oral surgery and who has been affiliated with a recognized hospital or teaching institution for at least ten years may also be accepted for examination. (This waiver will be discontinued on January 1, 1959.)

The American Board of Oral Surgery and the American Dental Association have defined oral surgery as that part of dental practice which deals with the diagnosis, the surgical and adjunctive treatment of the diseases, injuries and defects of the human jaws and associated structures. The scope of the specialty of oral surgery shall include the diagnosis, the surgical and adjunctive treatment of the diseases, injuries and defects of the human jaws and associated structures within the limits of the professional qualifications and training of the individual practitioner and within the limits of agreements made at the local level by the health team concerned with the total health care of the patient. In the past, preparation in the field of oral surgery has been gained through graduate and postgraduate courses, hospital internships and residencies and by preceptorship. All can recall those graduates who classified themselves as specialists in oral surgery or exodontics after availing themselves of a short postgraduate course conducted by an in-

dividual or by various groups, such course being devoted entirely to clinical phases of the subject without consideration of the basic sciences and other fundamentals.

The value of advanced training through dental internships and residencies, which are becoming increasingly available in hospitals throughout the country, depends entirely on the activity of the oral surgery staff. The way the service is directed and the ability of the staff to instruct dental graduates properly in the care of oral surgical conditions determine the value of the training. Too often the dental intern or resident is left to follow his own initiative and knowledge in the treatment of oral diseases, abnormalities and injuries. Such experience is of limited value to him from the standpoint of advanced training.

This, then, is the story of one specialty board in dentistry. Both the specialty groups and the dental profession can profit from some of its hard-earned experiences.

To date, it has been learned that "a specialty board is a voluntary agency concerned with the certification of the competency of professional health personnel in limited fields of practice."[1] This definition of Robert A. Moore was stated in his presidential address to the Advisory Board for Medical Specialties. In the definition, the word "voluntary" should be noted, and also that a specialty board deals with "certification of competence" of a practitioner.

Specialty boards in dentistry, and in other professions as well, must not lose their voluntary status. Once they become other than voluntary groups, it is but a little way until compulsion extends beyond the narrow range of a specialty into the broader fields of dental education, dental practice and relations with society which would be detrimental both to the profession and the public.

While discussing what specialty groups and boards should not be, it is well to state definitely that specialty boards are not educational agencies. They have not been established to usurp the function of the dental school and other institutions of higher dental education. They have not been established to attempt to compress the program of dental schools into the narrow channels of specialism. They have been established to assist in the improvement of dental health services.

A second point that has been learned is that the specialties have no real existence apart from the profession which fostered them. The board in oral surgery would, in my mind, be a futile thing were it not part and parcel of the great program of the organized dental profession. Although the young specialty boards occasionally complain about the strong parental hand, they will find in the long run—as all of us have in life—that "mother knows best." This is not to say that the specialty boards must follow without discrimination the policies that are enunciated in their behalf.

It is to say, however, that these boards must be given an active part in the development of policies, that they must be aware of their responsibilities in thinking beyond the narrow confines of their specialties, and that they must follow these policies in good faith once they have been accepted. To do otherwise is to tear and rend the fabric that constitutes the dental profession.

A third fact that has been learned through experience is that specialty boards are not the only groups concerned with the maintenance and elevation of standards. The specialty boards do this, of course, but they do not do it alone. The standards of a specialty board would mean nothing were they not integrated with the standards of the dental schools, with the *Principles of Ethics* of the American Dental Association, and with the

1. Moore, Robert A. Variations on a theme. Advisory Board for Medical Specialties, February 7, 1954. Mimeo.

legal statutes enacted by the various states.

A further point is that the specialty boards, although dependent on other agencies in the dental profession, must be independent in their function of certification. They must not respond to the pressure of the individual practitioner; they must not comply with the many requests for the arbitrary lowering of standards; they must not give in to pressures which are omnipresent.

A final point is that the specialty boards must not lend themselves to the development of artificial economic distinctions between specialists and other practitioners of dentistry. That is the way to disaster for it creates a separatism between specialist and general practitioner which cannot help but reflect itself in the service that is rendered to the patient.

The specialties of dentistry are in the developmental stage. They have made good progress. They need to look not only to their future programs but to the future impact their enlarged activities will have on every individual and agency concerned with rendering a health service. They need to know and recognize always that specialty boards have a limited function, but a highly important one.

They need to know that specialty boards will thrive only in an atmosphere of confidence and understanding within the broad scope of the dental profession itself. They need to know that specialty boards are a method and not an objective. They need to know that their final test will rest not with standards, prestige or economic advantages for their diplomates but on the quality of service they render to citizens of this country.

COMMENT

It is an interesting commentary that since their organization, the seven recognized specialty boards in dentistry have been operating faithfully under the direction of the Council on Dental Education and all changes in their requirements have been made by the authority of the Council on Dental Education.

The establishment of the boards has had a strong influence on the development of graduate programs and establishment of internships and residencies in all areas of dentistry. Since no internships or residencies were approved by the Council on Dental Education until 1948, no figures are available prior to that time.

In 1948, 20 hospitals had established internship or residency programs in oral surgery. At the present time, the Council has approved 70 straight internships in oral surgery and 82 residencies in oral surgery.

The earliest data which can be found on the number of formal graduate programs offered by the dental schools is based on the 1949-50 school year. This report shows that 13 of the dental schools offered graduate programs in oral surgery. A comparable report based on the 1956-57 school year shows 24 graduate programs in oral surgery.

These figures include Council approved oral surgery programs only, and do not represent the total number of programs available for the training of oral surgeons.

The latest report on graduate programs in dentistry prepared by the Council on Dental Education for 1956-57 shows 207 graduate programs being offered during the 1956-57 school year in 30 areas of the dental curriculum.

Graduate programs are being offered by 73 per cent of the dental schools. This is an increase of 11 per cent over the number of graduate programs that were available during the 1955-56 school year. The graduate programs range in length from nine months to five years.

There are many internship and residency programs in all areas of dentistry awaiting inspection and approval by the Council on Dental Education.

718 Roshek Building

Cases and Comments

IMPRESSION TECHNIC WITH RUBBER BASE MATERIALS FOR FIXED BRIDGE WORK

By Siegfried Gruenwald, D.D.S., Memphis, Tenn.

Since 1937 hydrocolloid has been used for accurate and speedy impressions for bridge work. Now the rubber base materials have been introduced to the dental profession. The process of setting of the rubber base materials is a cold vulcanization, which produces a permanent elastic rubber impression. The impression gives sharp details and does not require fixing. The material does not shrink or expand and permits ample working time. A technic for securing ideal results with rubber base materials for a fixed bridge is illustrated.

Fig. 1 • The preparations are covered with a sheet of carding wax about one eighth of an inch thick.

Fig. 3 • The impression is removed, and the region to receive the rubber base material is obtained by removing the wax. This will make a tray which can be accurately seated because of the plaster stops of the adjacent teeth. The rubber base material, which has some elastic spring, is held in the plaster matrix.

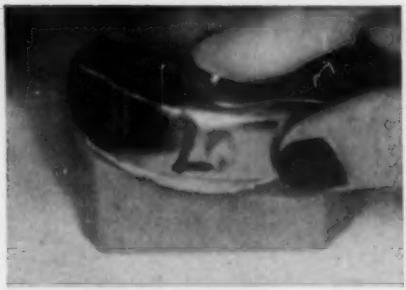

Fig. 2 • The teeth adjacent to the preparation are well lubricated, and an impression with fast-setting plaster is taken over the wax.

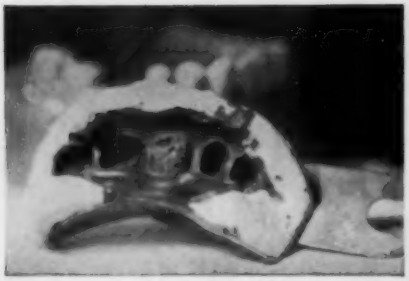

Fig. 4 • The plaster matrix is filled with the rubber base material. Saliva and debris are removed and the preparations dried. Rubber base material is teased into the grooves and gingival margins and the tray properly seated. The plaster matrix is kept firmly in place until set.

Fig. 5 • The impression is poured in stone (Diolite).

Fig. 6 • The dies are removed in one block. The dies will now be separated, placed back into the rubber base material and the model poured.

Fig. 7 • The dies are placed back in the impression. Pins and dies are well lubricated, and the working model is poured.

Fig. 8 • The bridge is constructed on the working model.

Conclusion • This technic has value as it is simple and provides sharp details. The material has toughness, so there is no tearing of margins. It requires no fixing, is correctable and elastic, springing over undercuts without tearing.

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Editorials

Tranquilizing agents and dentistry

The amazing manner in which Americans have embraced tranquilizing drugs spells trouble for the future in the opinion of the country's health authorities; trouble not only for those who use such drugs but for the physician and dentist who administer to their physical and dental disorders.

One of the latest warnings against the indiscriminate use of the new ataraxic drugs comes from the federal service.[1] The Army, according to news reports, has grounded its pilots who use such drugs. Pilots cannot resume flying until four weeks after they have stopped their use. "They are wonderful medicine but they don't mix with flying" one Army aviation medical officer declared. Neither has it been found to date that they mix well with dentistry.

The American Medical Association's Council on Drugs has issued a warning[2] to physicians to use discretion in administering meprobamate, one of the new tranquilizing agents employed extensively in treating emotional disorders. "The acceptance of the drug was based on observations in a relatively small number of patients" states the Council. "As the use of the drug has multiplied, however, it has become increasingly apparent that meprobamate is capable of producing a rather wide variety of side effects and untoward reactions. Although no fatalities have been reported, some of these reactions are alarming and potentially hazardous."

That meprobamate can be habit-forming in some patients, and that withdrawal symptoms are sometimes experienced, have been reported.[3] A warning of possible toxic and allergic reactions to meprobamate also has appeared.[4]

The Council on Dental Therapeutics of the American Dental Association, in the forthcoming 1958 edition of *Accepted Dental Remedies,* offers dentists these words of caution:

Several of the ataraxic or tranquilizing drugs frequently employed in medicine have important implications for the dentist. When chlorpromazine (Thorazine) hydrochloride is given for considerable periods of time, a reduction in leukocyte count occasionally occurs, which predisposes to infection. Occasional instances of agranulocytosis have also been reported in association with the prolonged use of this drug. There is also a tendency for postural hypotension to occur. It must be emphasized that epinephrine should never be used for vasomotor collapse (hypotension) in patients receiving chlorpromazine. Phenylephrine (Neo-synephrine) or levarterenol (Levophed) may be more useful pressor drugs for use in this emergency.

The same limitations relative to the treatment of vasomotor collapse pertain to patients receiving rauwolfia alkaloids such as Reserpine and Serpasile. It is recommended that the dentist routinely ask the patient whether he is receiving medication with any of these drugs.

Patients who receive heavy doses of a sedative drug should be warned not to drive a car, and should leave the office accompanied by a responsible individual. Failure to provide such warning to the patient may carry with it a certain degree of legal liability.

With specific reference to the ataraxic drugs the Council on Dental Therapeutics states:

"Evidence in support of the safety and usefulness of 'tranquilizing' agents in dentistry is not sufficiently conclusive to permit evaluation. The status of these drugs is under continuing review by the Council."

Until the safety and effectiveness of tranquilizing drugs are assured, the dentist will proceed cautiously in using them. Furthermore he will be wise to ascertain whether the patient is taking one of the tranquilizing agents. If so, he will proceed with caution because such patients usually are somewhat under sedation and the superimposition of another sedative by the dentist might compound the patient's central depression with serious results.

1. Associated Press report from Washington, D.C., April 20, 1957.
2. Potential hazards of meprobamate. J.A.M.A. 164:1332 July 20, 1957.
3. Lemere, F. Habit-forming properties of meprobamate (Miltown or Equanil). A.M.A. Arch. Neurol. & Psychiat. 76:205 Aug. 1956.
4. Friedman, Henry T., and Marmelsat, Willard L. Adverse reactions to meprobamate. J.A.M.A. 162:628 Oct. 13, 1956.

A new approach to the problem of dental nomenclature

The choice of a single word, or its definition, in several recent cases, has determined the outcome of a situation vital to the dental profession. The deletion of the terms "occlusion" and "design" from the responsibilities of technicians as set forth in the revised rules issued by the Federal Trade Commission for dental laboratories, is a case in point.[1] Another is the attempt by one party in the controversy over the province of oral surgery to dispose of the whole matter by coinage of that strange redundant term "dental-oral surgery," with its implied restrictions.[2] The familiar term "clinic," when applied to a private practice, has posed questions of ethics in the Judicial Council.[3] Because of certain questions of first allegiance, practitioners devoted to dental health interests are divided as to whether their field is "dental public health" or "public health dentistry."[4] Considerations of public relations have condemned the

old "grievance committee" of the component society and brought into being the new "patient-dentist relations committee."[5]

As important as are these professional problems of terminology, those of the scientific and technical aspects of dentistry are equally vital though perhaps not so obviously so. Problems of occlusion, for instance, might be more definitely solved if there was agreement on the nature of "occlusion," "centric," "rest position" and "hinge axis." Similarly, periodontal diseases would be more susceptible to attack if the classification of pathoses were universally accepted and the terminology was stabilized.

The new treatise, entitled *Vocabulary of Dentistry and Oral Science,* shortly to be published by the American Dental Association, is expected to help the profession solve some of these problems of nomenclature. The book is intended to be educational and not dogmatic. The problems of terminology are stated and the principles of choice are set forth with a view to making the study of dental nomenclature easier for the dentist and dental student. An understanding of the composition of words and the multiplicity of influences acting on them will enable the practitioner, teacher, student, editor and author to judge words intelligently and remove the need for imposing authoritative word lists on dental authors. This new approach to the nomenclature problem, although certainly not intended as a final solution, promises progress and merits a thorough trial by the profession and by the schools.

1. News of dentistry. Dental laboratory rules amended June 14 by FTC. J.A.D.A. 55:98 July 1957.
2. Transactions of American Dental Association 1953, p. 144-145.
3. Transactions of American Dental Association 1955, p. 89, 93.
4. Stone, J. W. An effective dental division in the public health department. J.A.D.A. 54:173 Feb. 1957.
5. Transactions of American Dental Association 1951, p. 84.

Asian influenza and the dentist

Since widespread epidemics of influenza were reported in April and May of this year in the Far East, the disease has been gradually making its way around the world, into India, Latin America, Great Britain and the United States. By September 1 more than 30,000 cases in the United States had been reported.

Fortunately, although the current pandemic has been characterized by a high attack rate, the disease is relatively mild and is characterized by a low mortality to date. The virus responsible has been identified, and the vaccine to induce immunity is in production. Antibiotics now available should be able to prevent the bacterial complications that may accompany or follow influenza and caused deaths in past influenza epidemics.

Strains of influenza virus from the current outbreak were isolated quickly by workers at the 406th Medical Laboratory of the United States Army in Japan and sent to workers at the Walter Reed Army Institute of Research. The causative factor of the new Far Eastern outbreak has been identified as a Type A influenza virus different from other influenza A viruses recovered heretofore. The absence of antibodies in the population against the new virus and its rapid spread indicate its potentiality as a health problem in the United States as in the rest of the world.

Vaccine for the current strain may become available in quantity before major outbreaks of Asian influenza occur in this country. About 1,700,000 immunizing doses were released before September 1, and United States drug manufacturers are expected to turn out 85,000,000 doses by the end of 1957.

The dentist has two responsibilities in this situation.

First, he should himself receive the immunizing vaccine in order to assure that there be no interruption in dental care available to the people. By his example, he will stimulate use of the vaccine among other groups in the population who also should be receiving this protection. Early immunization will permit the dentist to carry on with his task and should prevent transmission of the disease from dentist to patient.

Second, dentists and local dental societies should join the other health professions in encouraging those needing the immunizing agent to avail themselves of the vaccine.

International Correspondence

NEWS FROM GREAT BRITAIN

The annual conference of the British Dental Association was held in Newcastle in July. Arrangements for the scientific and social events, which were as near perfect as possible, were made by the Northern Counties Branch. The organizing committee (chairman, C. E. Vincent Jones; secretary, J. Chalmers) and the various subcommittees deserve the warmest praise for their untiring efforts. Robert V. Bradlaw, dean of the Sutherland Dental School of the University of Durham, and John Boyes, chairman of the demonstrations subcommittee, also contributed to the success of the meeting. Association president Harry Davis and Mrs. Davis were genial hosts and saw that the northern spirit of hospitality was evident throughout the week.

The branch and civic receptions were enjoyable and the presidential meeting, at which the Lord Mayor welcomed the Association to Newcastle, was unusually well attended. The University dined the representative board, and the highlight of social events, the annual dinner, was attended by 430 members and guests.

Honorary degrees were conferred on President Davis and on F. Hossack, president of the Dental Association of South Africa, by the University of Durham.

Among the distinguished visitors present in addition to Professor Hossack were Sir Arthur Amies and Ken Adamson, Australia; J.P. Walsh, New Zealand; Yap Jin Hwee, Hong Kong, and Doctors Brotman and Lavine, United States.

THE MC NAIR REPORT

Edward Samson, writing in the British Dental Journal on the McNair Report and its implementation, touches on one of the main causes of discontent in the profession with the General Dental Services. He writes as follows:

By now the McNair Report is in every dental household. The McNair Committee acquitted itself excellently and if its recommendations are not implemented the Committee will share with me a bitter disappointment. That this is the fate of so many White Papers must be admitted; though organized dentistry may, for once, be sufficiently persistent to irritate, nudge or press the appropriate departments into effective action.

There is such a profusion of wise and hopeful suggestions in the Report, the reader suffers an embarras du choix. Indeed, it is almost impossible to decide which are the most valuable of its numerous pearls. However, one clause, Para 62, particularly appeals to me. Referring to the many discontents of an over-planned profession, it says, "In the meanwhile, any preventable cause of irritation should be removed, or as far as possible mitigated." (A frustrated, often dejected profession may find "irritation" a mild description of its seething resentment. But it must not cavil. The intention is good. Let us read on.) "We accordingly recommend that in England and Wales the Minister of Health and the British Dental Association in consultation with the Dental Estimates Board, as soon as possible and thereafter at intervals of two years, review the list of treatments set out in the National Health Service (General Dental Services) Regulations as requiring prior approval in order to remove from that list any treatment which, by some other means, could effectively be prevented from being an occasion or source of abuse, either by patient or dentist. Similar reviews should be undertaken by the Scottish authorities."

In brief, if I may presume to summarize advice so sage, greater clinical freedom: which, to my untutored mind has always meant allowing a dentist to accept his full professional responsibilities. If he shirks them or indulges in skulduggery, let him be penalised after the offence; but for goodness sake!—and I mean goodness—let him be given a chance to prove his integrity. Greater clinical freedom, I admit, should not carry the right for dentists to spend public money free of all restraint. After all, pipers, especially official pipers, must always be allowed, will always expect to call the tune. Yet, in this case, the tune can and should be one of harmony, presenting fewer discords than are now apparent. Even more valuable to the dentist than his right to proceed with treatment unhindered, is the renewed dignity which would be bestowed upon him by that right. Surely there can be little more humiliating to an honest practitioner (and there are some, let the Treasury note) than having to explain to his patient, after careful diagnosis and prognosis, that he must ask permission to do his work. Neither the Dental Estimates Board's

queries, nor its occasional truculence over shillings, neither its obstinacies nor its annoying pedantry over minor regulations—none of these can so distress a dentist as having to admit to his patient that he is not the final arbiter of what is best for her. All these impediments to clinical freedom are, after all, simply arguments conducted by correspondence between two parties, neither of which sees or knows the other—an irksome process, but harmless to the dentist's reputation. Moreover, such occasions, if humiliating, do not in themselves shame a dentist. But when a man of experience and probity stands before his patient admitting that his opinion must be reviewed and tested by a higher authority, it is an indignity rightly resented. Though this is not the intention of the restriction, it is its effect.

If, as was once asserted by a Minister of Health, dentists are not to be trusted, if because of their inherent dishonesty and avarice they are ever seeking ways to defraud the Treasury, nothing yet devised will prevent them. In 1955 the Dental Estimates Board received 1,649,876 new estimates requiring prior approval, and 8,331,668 estimates not requiring prior approval, nearly eight times as many opportunities for abuse as for preventing it—even more than that, since only a minute proportion of those estimates seeking approval could have been investigated before it was granted. It is both administratively and physically impossible to prevent large numbers of wrong-minded practitioners, if such there are, from unscrupulous use of so vast, so continuous a service. Either a profession which has, over long years, proved its integrity and shown itself to contain no more delinquents than others less closely guarded, either it is worthy of trust or it is not.

If and when, at some remote unforeseeable date, the Minister of Health consults with the Dental Estimates Board and the British Dental Association to review the priority list, he might well remember the occasion on which his immediate predecessor congratulated the dental profession on attaining autonomy, and how he told us that we have proved ourselves capable and worthy of self-government—which, by implication, I would add, is also to be worthy of trust. As it is, dentists who work for the Service now have, as Marx nearly said, nothing to lose but their brains.

NATIONAL HEALTH SERVICE

Reference was made to doubts expressed in certain districts on the Government's policy on fluoridation of water supplies, and the Minister was asked for a statement.

The Parliamentary secretary in his reply referred to the demonstrations taking place in four different areas, saying that they had the Government's whole-hearted support. Experience in the U.S.A. has shown how the addition of minute quantities of fluoride to water supplies could lead to a notable reduction in dental caries. The current demonstrations were designed to show that the same results could be achieved in this country, and the Government is grateful for the initiative and foresight shown by local authorities taking part.

ITEMS OF INTEREST

The third Gibbs Traveling Scholarship has been awarded to D.H. Goose, chief dental officer of the Northamptonshire County Council. The £300 scholarship enabled the winner to attend the XIIth F.D.I. Congress in Rome, after which he left to study dental health education methods in Switzerland, Austria and West Germany. The administration of the scholarship was in the hands of a committee appointed by the British Society of Periodontology.

This Society also recently awarded the first annual prize for an essay by an undergraduate dental student to J.M. McCormack, Guy's Hospital Dental School. There were 19 essays submitted this year by students from most of the dental schools in Great Britain.

A new research building has recently been completed at the London Hospital. The building houses a dental research department, headed by A.E.W. Miles, consisting of three laboratories for research workers, a histological laboratory, a photographic darkroom and a small office.

The design of the dental laboratories was influenced by the changing trends in research. Although primarily planned for the needs of histological technics, each room is a general purpose laboratory, as far as possible, in order to provide for a variety of research projects in future years.

G. H. Leatherman,
D.M.D., F.D.S., R.C.S., F.A.C.D.

SCIENTIFIC SESSION PLANS FOR MIAMI MEETING COMPLETE; FEATURE BROADER PRESENTATIONS, MANY INNOVATIONS

Plans for the scientific session of the American Dental Association's 98th annual meeting have been completed, according to Charles S. Kurz, chairman of the Council on Scientific Session. Association members and guests who attend the meetings at the Dinner Key Auditorium, Miami, from November 4 to November 7 will note several basic changes in the structure of the program.

Group presentation rather than individual essays will be the major teaching method employed in the essay section of the scientific program. This forum style, patterned after the refresher course format, is designed to provide a more comprehensive treatment of scientific subjects for the dentist.

One and two day forums, an innovation in the Association's scientific program, will be presented by nationally known essayists. The two-day forum on dental practice will cover such aspects as efficiency in dental practice; the most effective use and the future function of the dental team—hygienists, assistants, laboratory technicians and business managers; the advantages and problems of high-speed cutting instruments, and the benefits and the ethical, legal, practical and business problems involved in partnerships, groups and associates in dental practice.

Topics for the two one-day forums are complete denture construction and local and general anesthesia in the dental office. Essayists participating in the first forum will discuss new technics and time-proved fundamentals of complete denture construction. Participants in the forum on anesthetic drugs will evaluate the newer local and general anesthetics.

Also prominent in this year's scientific session is the panel discussion. Ten half-day panels on the following topics will be presented: *practical endodontic technics,* a discussion of the fundamentals of treating routine and acute endodontic problems of anterior and posterior teeth; *periodontal disease,* a presentation of a coordinated approach to its prevention and control; *x-radiation in the dental office,* an exploration and evaluation of the radiation problem; *dentistry in 1967,* a projection of the major changes in equipment, drugs, technics and materials in the next decade; *x-ray interpretation in everyday practice,* a discussion of the interpretation and misinterpretation of routine roentgenograms; *current status of drugs in dentistry,* a presentation of when, how and why the newer drugs may be employed; *indications for and use of the various restorative materials,* a résumé of the physical properties of various restorative materials and the attributes which make them desirable for certain operations; *dental treatment of the chronically ill,* a discussion of the dentist's responsibility in the treatment of these patients; *a practical approach to dentistry for children,* an explanation of practical technics for the prevention of dental disorders in the child, and *occlusion,* an explanation of those factors of occlusion which may be influenced by the dentist and those which may not.

The individual essay program, prominent in other scientific sessions, will be presented only five times in the four-day program this year.

Another highlight of this year's meeting are the ten half-hour color television clinics, transmitted directly from the operating rooms of the Dade County (Florida) Dental Research Clinic. Association members and guests will view actual demonstrations of upper and lower

denture technic from impressions to finished dentures; early detection of cancer in and about the mouth; cleft palate prosthesis; hydrocolloid impression technic for construction of gold inlays and fixed bridges; removable partial dentures —high lights in their construction; roentgenographic diagnosis and demonstration of the location of the hinge axis; orthodontic technics; apicoectomy; porcelain jacket crown preparation utilizing an ultraspeed technic, and gingivectomy employing splints for postgingivectomy pack stabilization.

Two-way communication facilities will enable members of the audience to question clinicians during the operations. The entire cost of the program is being underwritten by Smith, Kline and French Laboratories of Philadelphia.

Among the other innovations at the Miami meeting are: the presentation of an essay program on Monday morning; the Spanish clinics, a morning of projected clinics conducted entirely in Spanish, and clinics on the production of slides and motion pictures.

In addition, reserve dental officers of the Armed Forces who attend any three of eight approved essay panel programs will be able to earn three retirement credit points upon proper registration. Also, the Academy of General Dentistry has announced that dentists may earn up to seven and one-half hours of membership credit by attending the one and two day essay forums. Part of the requirements for membership in the Academy are 50 hours of postgraduate work.

As in past years, projected clinics, table clinics, motion pictures and exhibits will complete the scientific session.

HIGHLIGHTS OF THE SCIENTIFIC PROGRAM

ANATOMY

Nov. 4	1:00 P.M.	Motion picture: Head and neck anatomy
	2:30 P.M.	Motion picture: Mandibular anatomy in relation to complete denture construction
	2:55 P.M.	Motion picture: Maxillary anatomy in relation to complete denture construction
Nov. 7	10:00 A.M.	Table clinic: New concept about the functional significance of the parapharyngeal spaces

ANESTHETIC REACTIONS

Nov. 4	1:30 P.M.	Essay in Forum on Anesthesia: Prevention and treatment of anesthetic reactions
Nov. 5	10:00 A.M.	Table clinic: Treatments of reactions to local anesthetics; treatment and prevention of anesthetic reactions

CANCER AND ORAL LESIONS

Nov. 5	10:00 A.M.	Television clinic: Early detection of cancer in and about the mouth
	10:00 A.M.	Table clinic: Benign and malignant tumors of the oral cavity
Nov. 6	10:00 A.M.	Table clinic: Biopsies—how, why and when
Nov. 7	12:05 P.M.	Motion picture: Horizons of Hope (research on destruction of cancer cells being conducted at Sloan-Kettering Institute)
Nov. 4 - 7		Scientific exhibits: Oral mucous membrane lesions; histopathology of oral lesions; benign and malignant tumors of the oral cavity

CIVIL DEFENSE

Nov. 4	10:00 A.M.	Clinical lecture: The dentist's role in disaster casualty care
Nov. 4 - 7		Scientific exhibit: Civil defense and the dentist

DENTAL AUXILIARY PERSONNEL

Nov. 4	10:30 A.M.	Projected clinic: Speedy training for chairside assistants by employing a tailormade visual manual
Nov. 5	10:00 A.M.	Panel in Forum on Dental Practice: Efficient office administration
	10:00 A.M.	Table clinics: American Dental Hygienists' Association
	10:00 A.M.	Table clinic: The role of the anesthesiologist in the management of the difficult ambulatory dental patient
Nov. 6	10:00 A.M.	Panel in Forum on Dental Practice: Dental auxiliaries, their present and future function in dental practice
	10:00 A.M.	Table clinics: American Dental Assistants Association
Nov. 4 - 7		Scientific exhibits: Patient education; the dental assistant of today

DENTAL PRACTICE

Nov. 4	1:30 P.M.	Panel: Dentistry in 1967
Nov. 5	1:30 P.M.	Forum on Dental Practice, Part I: Efficient office administration
Nov. 6	10:00 A.M.	Forum on Dental Practice, Part II: Dental auxiliaries, their present and future function in dental practice
	1:30 P.M.	Forum on Dental Practice, Part III: High-speed cutting instruments, advantages and problems
Nov. 7	10:00 A.M.	Forum on Dental Practice, Part IV: Partnerships, groups and associates in dental practice

DENTISTRY FOR THE HANDICAPPED

Nov. 4	10:00 A.M.	Table clinic: Dentistry for the handicapped child
	1:30 P.M.	Essay in Forum on Anesthesia: Simplified management of the handicapped or apprehensive patient
Nov. 5	10:00 A.M.	Table clinic: The role of the anesthesiologist teamwork in the management of the difficult ambulatory dental patient
	11:00 A.M.	Television clinic: Cleft palate prosthesis
	2:35 P.M.	Motion picture: Dental care of the child with cerebral palsy
	2:45 P.M.	Motion picture: Dentistry for the handicapped
	3:05 P.M.	Motion picture: Dentistry for the handicapped child
	3:35 P.M.	Motion picture: Premedication for reconstructive dentistry of cerebral palsy (adult) patients
	3:55 P.M.	Motion picture: Rehabilitation of patients with cleft lip and palate
Nov. 6	12:00 noon	Projected clinic: Ambulatory anesthetic management of the difficult dental patient
Nov. 4 - 7		Scientific exhibits: Oral-facial habilitation; feeding the cleft palate infant; oral conditions in the handicapped; prosthetic restorations in the habilitation of cleft palate individuals; cleft palate rehabilitation; experimental production and prevention of cleft palate and other congenital abnormalities; dental treatment of the cerebral palsied; maxillofacial prosthetics

EMERGENCIES IN THE DENTAL OFFICE

Nov. 4	9:55 A.M.	Motion picture: Resuscitation for cardiac arrest
Nov. 5	1:30 P.M.	Essay in Panel on Current Status of Drugs: Control of bleeding
Nov. 7	11:30 A.M.	Projected clinic: Control of hemorrhage

ENDODONTICS

Nov. 4	10:00 A.M.	Panel: Practical endodontic technics
	11:00 A.M.	Projected clinic: Indications and contraindications for apical resection and curettage with a one-sitting root canal filling
	3:35 P.M.	Motion picture: Endodontia and apicurettage
Nov. 5	10:00 A.M.	Table clinics: Simultaneous root canal therapy and apicoectomy; endodontic treatment of teeth with periapical curettage; root canal therapy

		and curettage for anterior teeth in one hour; indications and contraindications for apical resection and curettage with a one-sitting root canal filling
	2:30 P.M.	Television clinic: Apicoectomy
Nov. 6	11:00 A.M.	Projected clinic: Apical amalgam filling on nonvital teeth, with or without root canal fillings
Nov. 7	10:00 A.M.	Table clinics: Roentgenology applied in root canal therapy; group clinic by American Association of Endodontists
Nov. 4 - 7		Scientific exhibits: Endo-periodontics; root canal diameters compared with file and reamer sizes; root canal therapy and curettage for anterior teeth in one hour

FILLING MATERIALS AND TECHNICS

Nov. 4	11:30 A.M.	Projected clinic: Simplified Class V foil
Nov. 6	10:00 A.M.	Panel: Indications for and use of the various restorative materials
	12:00 noon	Projected clinic: Amalgam fillings in children's teeth

FLUORIDES

Nov. 7	11:50 A.M.	Motion picture: Science fights tooth decay
	1:00 P.M.	Motion picture: Science writers get the facts on fluoridation
	1:15 P.M.	Motion picture: The truth about fluoridation
Nov. 4 - 7		Scientific exhibits: Recent developments in the clinical use of stannous fluoride; laboratory methods for evaluating fluoride dentifrices

HIGH-SPEED CUTTING INSTRUMENTS

Nov. 5	10:00 A.M.	Table clinics: High-speed operative procedures in preparing teeth for full coverage; cavity preparation with ultrasonic technic
	3:30 P.M.	Television clinic: Porcelain jacket crown preparation utilizing an ultraspeed technic
Nov. 6	10:00 A.M.	Projected clinic: New concepts for accelerated procedures in restorative dentistry
	1:30 P.M.	Panel in Forum on Dental Practice: High-speed cutting instruments—advantages and problems

IMPLANT DENTURES

Nov. 4	10:00 A.M.	Table clinics: American Academy of Implant Dentures
	12:00 noon	Projected clinic: Use of the partial implant denture in full mouth reconstruction
Nov. 5	10:00 A.M.	Table clinic: The mandibular implant denture
Nov. 6	1:30 P.M.	Essay: Implant dentures—a critical evaluation after nine years
Nov. 4 - 7		Scientific exhibits: The subperiosteal implant denture; denture retention through magnet implants—a five year evaluation

IMPRESSION MATERIALS AND TECHNICS

Nov. 5	9:30 A.M.	Motion picture: Mandibular wax impression technic
	10:00 A.M.	Table clinic: Use of reversible hydrocolloids in construction of porcelain jacket crowns and the unit-built porcelain bridges
	10:05 A.M.	Motion picture: Impression technic for complete maxillary dentures
	10:30 A.M.	Television clinic: Hydrocolloid impression technic for construction of gold inlays and fixed bridges
	11:00 A.M.	Projected clinic: The rubber base materials in inlay, crown and bridge and ceramics
	11:30 A.M.	Projected clinic: Rubber base impressions for fixed or removable appliances and temporary fixed bridges in one appointment
	4:45 P.M.	Motion picture: Improved cast gold inlay technic using hydrocolloid

Nov. 6	10:00 A.M.	Table clinics: Group clinic by Odontic Seminar; Impression technic using rubber base impression materials; methods of ascertaining the physical properties of elastic impression materials; rubber base impression technics; practical evaluation of elastic impression materials
Nov. 7	10:00 A.M.	Group projected clinic: Impression materials
	10:00 A.M.	Table clinic: Use of rubber base impression materials

OCCLUSION—TEMPOROMANDIBULAR JOINT

Nov. 4	10:00 A.M.	Table clinic: Clinical manifestations of occlusal traumatism (in group clinic by New York University)
Nov. 5	10:00 A.M.	Table clinic: The temporomandibular joint and occlusion
Nov. 6	10:00 A.M.	Table clinic: Temporomandibular joint dysfunctions and diseases resulting in syndromes of neuralgia, arthritis, tension and emotional disturbances
Nov. 7	10:00 A.M.	Panel: Occlusion
Nov. 4 - 7		Scientific exhibit: A study of the temporomandibular joint physiology and the Bennett movement; occlusion and articulation

PHOTOGRAPHY

Nov. 4	10:00 A.M.	Table clinic: Intraoral photography and photographic case presentation
Nov. 6	10:30 A.M.	Motion picture program: Slide clinic
	1:00 P.M.	Motion picture program: Motion picture clinic

SPANISH CLINICS

Nov. 6	10:00 A.M.	Table clinics: Periodoncia: analisis de la dieta y su corrección; inmobilización en el tratamiento periodontal; superficie proximal de restauraciones; la preparación de coronas para pilares de cajas parciales; selección de materias dentales con atención especial sobre orificaciones de oro
Nov. 7	10:00 A.M.	Projected clinics: El reborde marginal en operatoria dental; la prevención de fracasos en obturaciones de amalgama; el factor nutricio en la etiología de las paradenciopatias; consideraciones biológicas en odontología restaurativa; acceso en el tratamiento de conductos radiculares

TIME AND MOTION STUDIES

Nov. 5	1:30 P.M.	Essay in Forum on Dental Practice: Time and motion studies
Nov. 7	10:40 A.M.	Motion picture: Motion study in the dental operatory

X-RADIATION

Nov. 4	1:30 P.M.	Panel: X-radiation in the dental office
Nov. 6	10:00 A.M.	Projected clinic: Controlling radiation in the dental office
Nov. 4 - 7		Scientific exhibit: How to decrease x-radiation dosage

SOCIAL EVENTS

Social activities, too, have their place on the Association's agenda. These will be centered in the fabulous hotels at Miami Beach and will include programs for the dentists' wives, the President's Dinner, receptions for international guests and scientific session participants and a past presidents' luncheon.

High light of the social calendar is an evening of entertainment on Tuesday, November 5, in the Grand Ballroom of the Fountainebleau Hotel, immediately following the general meeting during which president Harry Lyons will address

the convention. Entertainment includes a concert by the "Strolling Strings" through the courtesy of the U. S. Air Force, a water show and dancing.

MEMBERSHIP CARDS

Dentists are reminded to bring their 1957 American Dental Association membership cards to the meeting for admission to the scientific program. This year, these cards will be stamped on the back during registration and should be kept to verify attendance at the meeting for income tax purposes.

TRUSTEES IN FOUR DISTRICTS TO BE ELECTED AT MEETING

The election of the Trustees for the Second, Eleventh, Twelfth and Thirteenth Districts will be conducted during the Association's annual meeting this year. Trustees whose current three-year terms will be completed are: Percy T. Phillips, C. S. Renouard, Harold M. Flickinger and John R. Abel. Only Dr. Abel is eligible for re-election.

STATE OFFICERS TO HEAR MALPRACTICE DISCUSSED

Members of the Southern California State Dental Association will present a panel discussion on "Malpractice is an Occupational Hazard" at the Conference of State Society Officers to be held November 3 at the Eden Roc Hotel—Palladium Theater, Miami Beach.

Melvin E. Ralston will act as moderator; participants and their topics include: Carlton H. Williams, office hazards; J. C. Almy Harding, roentgen ray hazards; J. Lorenz Jones, anesthetic hazards; Earl J. Thee, operative hazards; Bruce R. Kurz, counseling committee, and Mr. James Robinson, patient relations.

Other topics to be discussed during the half-day meeting are the financing and construction of a building for a state dental society's headquarters, by Carl V. E. Cassel, secretary, Minnesota State Dental Association; the dental society's role in dental health education, by Perry J. Sandell, director of the Bureau of Dental Health Education of the American Dental Association, and legal problems of constituent dental societies, by John G. Rooks, executive secretary, California State Dental Association.

Robert C. Frates, treasurer of the California State Dental Association and president of the Conference, will preside. Bryant S. Carroll, president, Florida State Dental Society, will deliver the welcoming address. The meeting will adjourn after a luncheon during which William R. Alstadt, president-elect of the American Dental Association, will address the group.

SOCIETIES TELL PLANS FOR PRE-CONVENTION MEETINGS

The following societies have announced their schedules of meetings and social events which will be held prior to the annual meeting of the American Dental Association in Miami:

American Academy for Plastics Research in Dentistry • Americana Hotel, Miami Beach, November 3. Ad interim committee meeting. Academy members are invited to attend. LaMar W. Harris, 25 E. Washington, Chicago.

American Academy of the History of Dentistry • Eden Roc Hotel, Miami Beach, November 1. Milton B. Asbell, 25 Haddon Ave., Camden, N. J.

American Denture Society • Americana Hotel, Miami Beach, November 1, 2 and 3. Scientific program on complete dentures, partial dentures and prosthetic rehabilitation. Attendance limited to membership only. Arthur L. Roberts, 4 Main St., Aurora, Ill.

American Society of Dentistry for Children • Balmoral Hotel, Miami Beach, November 1, 2 and 3. Table clinics, scientific program. John Tabak, Venetian Medical Building, Miami.

National Alumni Association of the University of Maryland • Seville Hotel, Miami Beach, November 3, November 5 (breakfast only) and November 5 (evening entertainment only).

Committee for the Study of Ultrasonics in Dentistry • Seville Hotel, Miami Beach, November 3. All-day symposium. Stanley D. Tylman, College of Dentistry, University of Illinois, 808 S. Wood St., Chicago.

Association Affairs

A.D.A. CHAIRMEN, SECRETARIES TO MEET IN DECEMBER

December 16 and 17 are the dates of the second conference of chairmen and secretaries of the Association's 17 councils. This meeting, first held in February 1954, will take place at the Central Office.

Louis M. Cruttenden, assistant secretary of the American Dental Association, is in charge of the arrangements for the forthcoming conference. Members of his committee include Harold Hillenbrand, Association secretary; Rudolph H. Friedrich, secretary of the Council on Dental Health; Herbert B. Bain, director of the Bureau of Public Information; Peter C. Goulding, secretary of the Council on Scientific Session, and Reginald H. Sullens, associate secretary of the Council on Dental Education.

EDUCATION COUNCIL APPROVES PROGRAMS AT NAVAL HOSPITAL

The Council on Dental Education and its Committee on Internships and Residencies announce the approval of the following educational programs at the U. S. Naval Station, Treasure Island, Calif.:

Residency in periodontics (12 months)

Residency in prosthodontics (12 months)

Approval of these educational programs brings to a total of nine the number of internships and 13 the number of residencies approved at nine Naval hospitals by the Council and Committee of the American Dental Association.

STUDY PLANNED TO LEARN DENTAL CARE HABITS

B. Duane Moen, director of the Bureau of Economic Research and Statistics of the American Dental Association, has announced that Social Research, Inc., will conduct a motivational research pilot study for the Association. Objective of this survey is to determine the underlying reasons typical individuals have for caring for or neglecting their teeth.

More than 100 persons in a typical community will be interviewed exhaustively regarding their views concerning dentistry and their dental habits and practices. Results of these depth interviews will be interpreted by psychologists, sociologists and other behavioral scientists. Findings are expected to be available early next year.

DENTAL REPRESENTATION ON ADVISORY COMMITTEE SOUGHT

Appointment of a committee of special consultants to advise him on the status and future needs of medical education and medical research was announced late in August by Marion Folsom, secretary of the Department of Health, Education and Welfare. Dental representation on this new committee has been recommended by the American Dental Association.

Noting that the group would be concerned with research programs administered by the National Institutes of Health in colleges and other research institutions and recognizing that the Institute of Dental Research would not be represented, Louis M. Cruttenden, assistant secretary of the Association, wrote Secretary Fol-

som that ". . . In order that the nation's dental research program and the needs of dental education will be given the consideration that they merit, the American Dental Association requests that you consider appointing to the committee a person who is conversant with dental education and with the enlarged program of research in dentistry."

During the tenth annual meeting of the Faculty of Dental Surgery of the Royal College of Surgeons, London, Harold Hillenbrand (l.), secretary of the American Dental Association, was presented by the dean of the Facutly, Sir Wilfred Fish (c.) to the new president of the college, Sir James Paterson Ross, for admittance as a Fellow in Dental Surgery. The ceremony was held in the Great Hall of the College of July 19.

AMERICAN DENTAL DIRECTORY TO BE PUBLISHED IN DECEMBER

The 1958 edition of the *American Dental Directory* will contain over 1,200 pages of information on more than 100,000 U. S. dentists, according to John J. Hollister, Association business manager. Both alphabetical and geographic listings of dentists are included in this publication.

In addition to the dentist's name and address, the book shows Association membership status, character of practice, school and year of graduation. Also included are lists of dental schools, dental specialists, addresses of state dental organizations and their officers and information regarding national dental organizations throughout the world.

Orders for the 1958 *Directory* are now being accepted. A special pre-publication price of $12.50 is being offered for orders received by November 7. After that date, the price will be $15.

SURVEY OF 1956 DENTISTRY ARTICLES AVAILABLE

Reprints of *The 1956 Survey of Dental Practice* are available in pamphlet form, according to B. Duane Moen, secretary of the Association's Bureau of Economic Research and Statistics. These articles originally appeared in nine consecutive issues of THE JOURNAL, beginning in November, 1956. Single copies of the booklet are available on request from the Bureau, 222 E. Superior St., Chicago.

L. W. MORREY TO SPEAK AT DENTAL WRITERS' MEETING

Two noted authorities on scientific writing will address a dental writing conference, sponsored by the Northeastern Association of Dental Editors, in New York on December 4. J. P. Gray, M.D., visiting lecturer, American Medical Association, will speak on "Communications in Medicine." In his address, the editor of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, L. W. Morrey, will advise the group on how to "Say it Simply."

Participants in the scheduled panel discussion include Milton B. Asbell, senior lecturer in dental history, Seton Hall College of Dentistry; Bruce L. Douglas, president, Northeastern Association of Dental Editors, and Austin H. Kutscher, secretary-treasurer, American Association of Dental Editors.

This is the first conference of its kind to be held in the New York area. Purpose of the meeting is to bring together all dentists in that area interested in writing for dental literature.

Reservations for the one-day meeting, to be held at the Hotel New Yorker, can be addressed to A. J. Costa, chairman,

633 Ridge Rd., Lyndhurst, N. J. There is no charge for the conference; for those wishing to attend the dinner, reservations are $6.50.

ASK GROUP PRACTITIONERS TO RETURN QUESTIONNAIRES

Dentists engaged in a partnership, expense-sharing arrangement or any other type of group practice are being reminded to complete and return the brief questionnaire recently mailed to them with the Association's *Information Bulletin* on hospital dental service. The Bureau of Economic Research and Statistics of the American Dental Association is conducting a survey to determine the extent and nature of group dental practice arrangements. The questionnaire is contained on the back of a business reply card.

REPRINTS OF S. PETERSON'S VOCATIONAL ARTICLE READY

Limited supplies of reprints of the vocational article on dentistry, "A Career in Health—Dentistry," are available from the Association's Council on Dental Education, 222 E. Superior St., Chicago. This article, prepared by Shailer Peterson, the Council's secretary, appeared in the September issue of *Health* magazine, a publication of the American Osteopathic Association designed for consumption by the layman.

L. PIERCE ANTHONY SUCCUMBS; KNOWN AS DENTAL JOURNALIST

A former editor of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION and of the *Dental Cosmos,* L. Pierce Anthony, died on September 2, at a hospital in LaGrange, Ill. He was 80 years old.

His association with the *Cosmos* began in 1904, and in 1930 he became editor of the publication. In 1937, when it was merged with THE JOURNAL, Dr. Anthony became associate editor of the latter publication, succeeding to the position of editor the following year on the retirement of the late C. N. Johnson. He held this post until his retirement in 1944.

L. Pierce Anthony

Dr. Anthony's other contributions to dental literature include the editorships of *A Dictionary of Dental Science* and *Dental Terminology.* He also served as co-editor and, later, editor of the *American Textbook of Prosthetic Dentistry.* During his career, Dr. Anthony served as chairman of the Association's Committee on Nomenclature and as secretary to the Commission on Terminology of the Fédération Dentaire Internationale.

Legislation

HEARINGS ON TAX REVISION SCHEDULED BY CONGRESS

Chairman Jere Cooper (D. Tenn.), Committee on Ways and Means, stated that beginning January 7, 1958, the Committee would take up a wide variety of measures for improving the income tax measures of the internal revenue code. Because of the limited time available, these hearings will have to be concluded by February 7, 1958.

Supporters of the Jenkins-Keogh measure will appear to testify on behalf of the bill during that time. This bill (H.R. 9

and 10) would allow self-employed groups an opportunity to defer income tax on a small part of annual income set aside for their own retirement. The American Dental Association, through its assistant secretary, Louis M. Cruttenden, recently wired each member of the Ways and Means Committee, urging them to give favorable consideration to this proposal.

CONGRESS TO STUDY BILL FOR NATIONAL HEALTH INSURANCE

Among the measures to be considered by Congress when it reconvenes in January is a new version of a proposed national health insurance program. This measure, which seeks to provide a comprehensive hospital and surgical care program for beneficiaries of the Old Age and Survivors' Insurance program, would make certain dental services available to this group. According to the provisions of this bill, surgical care is defined to include "oral surgery when provided in a hospital."

This bill, introduced by Rep. Aime J. Forand (D., R.I.), a member of the House Ways and Means Committee, would be financed mainly by increasing the individual OASI tax base from $4,200 to $6,000 annually.

International

GERMANY STRENGTHENS ITS DENTAL PRACTICE ACT

A new dental practice act in Germany, which became effective July 1, 1957, sets forth clearly and concisely the responsibilities of the dentist and the status of the dental laboratory and dental technicians.

Commenting on this legislation, the German Dental Association in the June 1, 1957 issue of its journal *Zahnärztliche Mitteilungen* reports that under the new law:

1. Missing and lost teeth are regarded as oral diseases.

2. Only licensed, that is college-educated, dentists are permitted to replace teeth and to insert restorations in the mouths of patients.

3. Dental laboratories or dental technicians who violate the dental law for the first time are to be sentenced by the lower courts to pay a fine of not less than DM. 200 (approximately $40).

In the opinion of the German Dental Association, dental laboratories and dental technicians in that country who wish to construct dentures directly for patients are in the minority. The great majority of laboratories and technicians, organized within the Association of the German Dental Laboratories and the Society of German Dental Technicians, are willing to comply with the law and function on friendly terms with the German Dental Association and its constituent and component societies.

During the open hearings which were held previous to the passing of the new dental law, it was established that insertion of dental prostheses requires an enormous amount of medical and biologic knowledge. The decision as to the type of restoration to be inserted in individual instances can only be made by a dentist who, because of his training and education, is capable of anticipating the effects which different types of prosthetic restorations will have on the oral tissues, including the remaining teeth, the mucous membrane and the oral muscles, and also on the temporomandibular joint.

Prior to the enactment of the new dental law, the German Minister of Labor and Public Health published an edict in which he stated that under the regulation of the German Health Insurance Act, only dentists would be paid for constructing and inserting prostheses and not "craftsmen such as dental technicians or

workers employed by dental laboratories."

The statement made during the public hearings that dental laboratories and practicing dental technicians are able to construct and insert prostheses less expensively than dentists was ruled immaterial.

The agreements between the German Health Insurance authorities and the German Dental Association cover 80 per cent of the German population. Similar agreements between the Health Insurance authorities and the Association of Dental Laboratories or the Society of Dental Technicians do not exist and will not be made.

The claims of the minority of dental laboratories and dental technicians that skilled and experienced craftsmen are able to construct and insert prostheses which fit perfectly has no bearing in the opinion of the court because it was testified by dentists, physicians, and members of the other and larger group of dental laboratories and technicians that a prosthetic appliance which seemingly fits can cause severe injury to oral tissues with subsequent complications and injury to the general health of the patient.

INTERNATIONAL MEETINGS TO CONVENE IN MANILA

Two international dental meetings, the second Asian Dental Congress and the Asian-Pacific Dental Conference, will be held simultaneously from March 24 to March 28, 1958, in Manila, Republic of the Philippines.

Twenty-one countries and officers or representatives of the Fédération Dentaire Internationale are expected to attend. The countries invited are: Australia, Burma, Cambodia, Ceylon, Nationalist China, Formosa, Hawaii, Hongkong, India, Indonesia, Japan, Laos, Malaya, South Korea, New Zealand, Okinawa, Pakistan, Thailand, South Vietnam, the United States and the Philippines.

The scientific sessions include essays, lectures, table clinics, projected clinics, forums and scientific and commercial exhibits.

Agustin L. Zarate, president of the Philippine Dental Association and general chairman of the second Asian Dental Congress, can be contacted at P.O. Box 1142, Manila, for further information.

PARAGUAYAN DENTISTS ELECT VICTOR BOETTNER PRESIDENT

Victor A. Boettner has been elected president of the Círculo de Odontólogos del Paraguay. Accompanying Dr. Boettner into office are: César F. B. Franco, vice-president; Miguel Angel Barreiro, secretary; Juan María Ríos Gautier, assistant secretary; Carim Bittar, treasurer, and Norman Zavala, assistant treasurer.

AUSTRIAN LAW LIMITS DENTAL PRACTICE TO DENTISTS

The dentists and dental laboratory technicians of Austria are united in their opposition to socialized dentistry but have never agreed fully on their interpretation of the Austrian Dental Practice Act, reports the *Journal of the Austrian Public Health and Hospital Insurance Authorities.*

Austrian dentists maintain that there should be no misunderstanding of the provision of the act which stipulates that the practice of dentistry should be limited to members of the dental profession and that dental laboratory technicians or auxiliary personnel must work under the supervision of the dentist.

In support of this contention, the editor of the *Journal of the Austrian Dental Association* calls attention to an edict issued on December 1, 1953, by the Austrian Minister of Social Administration as follows:

The Department of Public Health of the Ministry for Social Administration is informed

that in several instances artisans such as dental technicians have violated the dental law (paragraphs 1 and 2) by constructing and inserting dental prostheses without the direction and supervision of licensed dentists, and that agencies of the Public Health and Hospital Insurance Authorities have supported these unlawful procedures by inducing laboratories and technicians to perform such prosthetic work, and by accepting and paying bills covering such services rendered.

In Austria, the practice of dentistry is unconditionally restricted, and only dentists are authorized to render dental service directly to patients (paragraph 1 of civil law No. 92/1949).

According to paragraphs 1 and 2 of civil law No. 90/1949 regulating the activities of dental laboratories and dental laboratory technicians, such technicians are authorized to take impressions, construct dentures, crowns and bridges only under the direction and supervision of a licensed dentist.

The legislation emphasizes the biologic importance of inserting prostheses in the patient's mouth, and restricts this activity to college-educated trained and licensed dentists. Therefore, by law, the independent construction and insertion of dental prostheses falls in the field of dentistry.

Every performance of such dental services by persons other than dentists is unauthorized and presents an offense against the dental law.

Copies of the dental and medical laws and of the law regulating the activities of dental laboratories and technicians are attached.

(signed) for the Minister of Social Administration

Khaum, m.p.

A group of 13 German dentists, including professors and laboratory technicians from the University of Marburg Dental School and practicing dentists from the Giessen area, visited the 2d Medical Detachment's Central District Laboratory in Frankfurt as guests of the 86th Medical Detachment during German-American Friendship Week. Col. Lynn C. Dirksen, commanding officer of the central laboratory, explained and illustrated the various methods and latest technics used by the dental service in the fabrication of dental appliances and restorations.

WHO PLANS PUBLICATION OF DENTAL SCHOOLS DIRECTORY

In a recent letter sent to all member states, the director-general of the World Health Organization (WHO) disclosed that the organization is collecting information on dental education from all countries for the purpose of publishing a *Directory of Dental Schools.* The letter requests that full details of dental education, including a list of faculties, schools or colleges of dentistry be furnished by the respective countries. Attached to the letter is a guide outline which lists a number of questions on dental education.

ORDER INVESTIGATION OF POLISH CONCENTRATION CAMP

An investigation to establish the responsibility for the killings of about 7,500 physicians and dentists since World War II will be conducted at the Polish concentration camp in Lamsdorf near Oppeln. News of this investigation was received by H. Esser, chairman of the Society of Evacuated German Physicians and Dentists, from the attorney general of the Polish Republic. The Society represents all physicians and dentists of German ancestry who were evacuated from previously German and now Polish provinces.

Dental Education

PUERTO RICO TO INAUGURATE DENTAL SCHOOL IN NOVEMBER

Ceremonies celebrating the opening of the School of Dentistry of the University of Puerto Rico, San Juan, will be held on November 9, and will be followed immediately by a dental conference that will end on November 12. Although the first freshman class of 28 students entered the school on August 19, these dates were selected so that dentists attending the Association's annual session in Miami would find it more convenient to visit the university.

Gerald D. Timmons, dean of the School of Dentistry of Temple University, Philadelphia, will deliver the inaugural address, "The Role of Dental Education in the Next Decade." R. H. Sullens, associate secretary of the Association's Council on Dental Education, will represent the Council at the ceremonies.

Approximately 12 deans of schools of dentistry will participate in the dental conference to follow. Topics for the panel presentations and seminars include the role of dentistry in the community, in health services and in research; the role

The School of Medicine of the University of Puerto Rico, where the new School of Dentistry will be housed

of operative and prosthetic dentistry in the next decade and the role of oral medicine and children's dentistry in the next decade.

USPHS SPONSORS PROGRAM FOR ORAL PATHOLOGISTS

Effective July 1, 1958, a two-year postdoctoral research training program in oral pathology will be offered by the National Institute of Dental Research at the National Institutes of Health, Bethesda, Md. The program will provide the equivalent of a two-year research residency training which may lead to certification by the American Board of Oral Pathology.

Prerequisites for appointment are graduation from an approved dental school, completion of a dental internship in an approved hospital and at least one year of graduate training in a basic science field, or a suitable equivalent.

SCHOOLS EXPAND CURRICULA TO KEEP DENTISTS INFORMED

Cincinnati • Fluorides will be the subject of a three-day symposium to be presented December 9-11 by the Institute of Industrial Health at the College of Medicine of the University of Cincinnati. Considerable unreported data will be discussed. Further information is available from the secretary of the Institute, Kettering Laboratory, Eden and Bethesda Avenues, Cincinnati 19.

Indiana • A one-day symposium on the treatment of periodontal diseases will be presented by the Indiana University School of Dentistry on October 23 at the State Board of Health Building, Indianapolis. Topics to be discussed are classification of periodontal diseases, local and systemic factors in gingivitis, roentgenographic changes in periodontal disease, fixed and removable splinting of teeth, relationship of occlusion to periodontal involvements, correction of occlusal disharmony of the natural dentition, periodontosis and the evaluation and treatment of the patient with periodontitis.

Loyola • Infection, trauma, neoplastic diseases and congenital deformities will be four of the major topics to be included in the one-week postgraduate course in oral surgery to be held by the School of Dentistry of Loyola University (Chicago) from November 18 to November 22. Students will practice surgical technics on cadavers in the laboratory. The director of the postgraduate division, 1757 W. Harrison St., Chicago, has further information.

Marquette • Seven postgraduate refresher courses are being offered during the fall quarter by Marquette University School of Dentistry. Included are partial dentures, oral medicine, oral surgery, orthodontics, dentistry for children, roentgenography and operative dentistry. Details about enrollment are available from the university's postgraduate division, 604 N. 16th St., Milwaukee.

Oregon • Eleven postgraduate courses will be offered by the Dental School of the University of Oregon. Subjects include functional esthetic dentures, pharmacology, general anesthesia, crown and bridge, limited orthodontics, high-speed technic, hypnosis in dentistry, nutrition, dental materials, new concepts in dentistry and psychological problems. Information regarding dates and tuition can be obtained from the head of the department of postgraduate education, 611 S.W. Campus Drive, Portland 1.

Washington • A four-day refresher course in complete and partial denture prosthesis will be offered by the University of Washington School of Dentistry from October 30 to November 2. Enrollment will be limited and the department reserves the right to select participants on a geographical basis. Detailed information may be obtained from the University's postgraduate dental education department, Seattle 5.

OFFER SCIENCE TRAINEESHIPS AT PENNSYLVANIA

Fellowships and traineeships in the biological sciences are available to qualified applicants from the University of Pennsylvania School of Dentistry. Candidates may follow programs leading to the degrees of Master of Science and Doctor of Philosophy.

This program is supported by a continuing grant from the National Institute of Dental Research, U. S. Public Health

Service of the Department of Health Education and Welfare.

Candidates must qualify for admission in the Graduate School of Arts and Sciences. Remuneration will vary depending on the needs of the successful candidates.

Dental Societies

GREATER NEW YORK MEETING TO BE HELD DECEMBER 9-13

Robert E. Morse, general chairman of the 33rd annual Greater New York Dental Meeting, reminds those planning to attend that the meeting will be held one week later than usual this year.

This year's program will cover the latest developments in all phases of general and specialized practice. Among the topics to be presented are complete mouth rehabilitation, systemic involvement, endodontics, periodontics and surgery, use of new impression materials and the effects of high-speed instrumentation on the pulp.

Many association groups will meet immediately prior to or concurrent with the meeting. These will include: the American Academy of Dental Medicine, American College of Dentists, Association of Women Dentists, board of directors of the Dental Society of the State of New York, New York Academy of Prosthodontics, International College of Dentists, Pan-American Odontological Association and numerous dental fraternities, school alumni associations and the dental hygienists' and assistants' groups.

The week-long meeting will be held at New York's Hotel Statler. Further information will be furnished by Mrs. Mabel Purdy, executive secretary, Room 106A, Hotel Statler, New York.

SIX CLINICIANS FEATURED AT NEW ORLEANS CONFERENCE

Plans for the tenth annual New Orleans Dental Conference of the New Orleans Dental Association include general assemblies, limited attendance clinics, general clinics, motion picture programs and scientific exhibits. The full scientific program will be held November 10-13 at the Roosevelt Hotel, New Orleans.

Featured clinicians and their topics are: Robert E. Willey, Los Angeles, "Why Do Bridges Fail"; Floyd A. Peyton, Ann Arbor, Mich., "Current Trends and Developments in Restorative Materials and Dental Instruments"; Ralph F. Sommer, Ann Arbor, "Surgical vs. Non-surgical Management of Teeth with Periapical Involvement"; Cecil H. Bliss, Sioux City, Iowa, "New Approach to the Problem of Case Presentation"; Joseph L. Bernier, "Modern Viewpoint on the

Celebrating his 50 years in dentistry with Clarence G. Brooks are (l. to r.) Jesse J. Englander, president, Connecticut State Dental Association; Robert W. Strang, director, Fones School of Dental Hygiene; William J. Murray; Dr. Brooks; Arthur W. Easton, A.D.A. First District Trustee, and Alan L. MacDonald.

Etiology and Treatment of Periodontal Disease," and R. A. McEwen, "An Analysis of High Speed."

GUIDES FOR SCHOOL DENTAL CONSULTANTS AIM OF MEETING

The Arkansas State Dental Association, in cooperation with the Division of Dental Hygiene of the Arkansas State Board of Health, sponsored a two-day biennial dental health conference at Petit Jean State Park. Objective of the meeting was to develop a set of suggestions or guides to aid school dental consultants in their work with schools and communities.

Featured on the program were panel and group discussions. Among the guests and speakers were Donald Dukelow, consultant in health and fitness, American Medical Association; William Alstadt, president-elect, American Dental Association; Maurice J. Friedman, chairman, Dental Health Committee, Arkansas State Dental Association; Gus Pinkerton, chairman, Council on Dental Health, Texas State Dental Association, and Perry Sandell, director, Bureau of Dental Health Education, American Dental Association.

C. BROOKS HONORED BY NEW LONDON COUNTY SOCIETY

On June 4, friends and associates of Clarence G. Brooks gathered in New London, Conn., for a testimonial dinner to honor him during his fiftieth year in dentistry. Doctor Brooks, recorder of the Connecticut Dental Commission and vice-president of the American Association of Dental Examiners, was presented with a life membership in the association.

SUBSCRIPT • The Fresno-Madera District Dental Society will conduct their second annual Mid-Winter Central California Dental Convention on October 26 at the Hacienda Motel, Fresno, Calif.

(L. to r.) Donald Dukelow, William Alstadt, Maurice J. Friedman, Gus Pinkerton and Perry Sandell.

National Defense

DEFENSE DEPARTMENT ADDS TEN BASES TO "REMOTE" LIST

Dependents of military personnel stationed at the bases listed below now are entitled to receive medical and dental care in accordance with Title I of the Dependents' Medical Care Act. Latest additions to the "remote areas" classification are:

Vint Hill Farms Station
Warrenton, Va.
Camp Irwin
Barstow, Calif.
Fort Benjamin Harrison
Indiana
U. S. Naval Ammunition Depot
Hawthorne, Nev.
Dover A.F. Base
Delaware
Eglin A.F. Base
Florida
Loring A.F. Base
Maine
Nellis A.F. Base
Nevada
Patrick A.F. Base
Florida
Wendover A.F. Base
Utah

This latest action by the Department of Defense places a total of 19 military installations on the "remote" list. To date, 78 such installations have asked to be classified "remote," according to Herbert

C. Lassiter, secretary of the Association's Council on Federal Dental Services and of the Council on Insurance. Many of these requests are still under consideration.

MEDICO-DENTAL SYMPOSIUM TO BE HELD AT PORTSMOUTH

"Advances in Operational Military Medicine" is the theme of a three-day program for the combined Armed Forces Medical Department Reserve Officers to be held at the U. S. Naval Hospital, Portsmouth, Va., on October 16-18. This first annual Medical Department symposium is being conducted under the auspices of the commandant, Fifth Naval District.

Among the guests and speakers on the first day will be Maj. Gen. James P. Cooney, Deputy Surgeon General, U. S. Army; Rear Admiral F. M. Hughes, commandant, Fifth Naval District; Rear Admiral O. B. Morrison, Jr., district medical officer, Fifth Naval District; Capt. G. W. Berry, district dental officer, Fifth Naval District; Capt. D. J. O'Brien, Jr., director, reserve division, Bureau of Medicine and Surgery, U. S. Navy; Capt. W. Leona Jackson, director, Nurse Corps, U. S. Navy; Col. Inez Haynes, chief, Nursing Service, Army Nurse Corps, and Lt. Col. Grace J. Hayden, chief nurse, U. S. Air Force.

The symposium has been approved for retirement point credit for those in attendance who are on the active status list in the Armed Services Reserve Program, provided they register with the authorized military representative assigned the duties of recording daily attendance.

SUBSCRIPTS • Brigadier General Arthur L. Irons recently was feted at Walter Reed Army Hospital upon his retirement as Chief of Dental Activities. General Irons, who has been in military service for 31 years, has joined the staff of Emory University, Atlanta, Ga. . . . Upon completion of his assignment as Chief of the Dental Service at Walter Reed Army Hospital, Col. Robert E. Hammersberg was cited with a certificate of achievement for the outstanding ability he displayed during his three-year tour. Presentation of the award was made by Maj. Gen. Leonard D. Heaton, Commanding General, Walter Reed Army Medical Center.

Public Health

WHO EXPERTS ISSUE REPORT; BACK FLUORIDATION PROGRAMS

"The effectiveness, safety and practicability of fluoridation as a means of preventing dental caries, one of the most prevalent and widespread diseases in the world, is now established." This is one of the conclusions of the Expert Committee on the Public Health Aspects of Water Fluoridation, called together by the World Health Organization (WHO) for a meeting in Geneva, Switzerland, in August.

In a report dated September 4—the first global report issued on this public health program—the international experts on developments in water fluoridation stated that all programs show remarkable uniformity. The prevalence of dental caries in a child's first teeth decreased some 50 to 60 per cent whereas the reduction of caries in children's permanent teeth was 60 per cent. Studies of adult populations living in areas where there are water fluoridation programs in effect reveal that caries prevalence was only about one third as much as for similar groups in fluoride-free areas.

Hundreds of controlled fluoridation programs now are in effect in 17 countries, according to the report. In the United States, 32 million people in more than 1,500 communities are using me-

chanically fluoridated drinking water. Other countries with fluoridation programs include: Australia, Belgium, Brazil, Canada, Chile, Colombia, El Salvador, Germany, Great Britain, Japan, Malaya, Netherlands, New Zealand, Panama Canal Zone, Sweden and Venezuela. Norway and Switzerland will raise this total to 19 in the near future.

"No other vehicles or techniques for the prophylactic application of fluorides can at present substitute for the fluoridation of drinking water as a public health measure," state the experts.

Members of the WHO Expert Commitee on Water Fluoridation included: Yngve Ericsson, associate professor of cariology and acting head of the department of operative dentistry, Royal School of Dentistry, Stockholm; A. J. Held, dean, Institut de Médecine Dentaire, University of Geneva; Jean Forrest, senior dental officer, Ministry of Health, London; Paulo de Silva Freire, chief of the dental section, Servicio Especial de Saude Publica, Rio de Janeiro; Harold C. Hodge, professor of pharmacology and toxicology, University of Rochester, Rochester, N. Y.; K. L. Shourie, principal, Sir C.E.M. Dental College and Hospital, Bombay, and John W. Knutson, assistant surgeon general and chief dental officer, U. S. Public Health Service, Washington, D. C. The WHO dental health officer is Carl L. Sebelius, Nashville, Tenn.

SUGGEST PRIORITY PROGRAM FOR FLU INOCULATIONS

A suggestion made by the American Dental Association to the Association of State and Territorial Health Officers late in August recommended that dentists and auxiliary personnel be considered for priority ratings for inoculation against Asian influenza. In a telegram to Surgeon General Leroy E. Burney of the U. S. Public Health Service, Louis M. Cruttenden, Association assistant secretary, stated: "The American Dental Association requests that the State and Territorial Health Officers give consideration to establishing a proper priority for dentists and auxiliary dental personnel in the program of inoculations against Asian influenza in order that there be no unnecessary interference with the availability of dental care."

The State and Territorial Health Officers adopted a resolution recommending that priority in vaccinations be given to (1) persons whose services are necessary to maintain the health of the community; (2) persons whose services are necessary to maintain other basic community services, and (3) persons with tuberculosis and others who constitute a medical risk.

Since dental care is an essential health service, dentists are being urged to receive the immunizing vaccine both to assure that this care for the public can be uninterrupted and to encourage, by example, use of the vaccine among others who should be receiving protection.

Research

NAVAL DENTAL CORPS PLANS ANTARCTIC DENTAL RESEARCH

A program of dental research to supplement the clinical work of the dentists volunteering to winter over in Antarctica during the International Geophysical Year 1957-1958 has been outlined by the Naval Dental Corps. The National Research Council, Committee on Dentistry, aided in formulating the research program. The plans are outlined in report no. 283 of the U.S. Naval Medical Research Laboratory. The report gives the results of observations made during the winter of 1956-57 in Deepfreeze I, and outlines research plans to be conducted during Deepfreeze II and the follow-up program. The author is Capt. William R.

Stanmeyer, head of the Navy dental research branch.

Lt. R. J. Adams of the Navy Dental Corps will be stationed at Little America, where the major portion of the physiological research will be done. The program will include clinical examinations, field observations and dental histories of all persons in the Deepfreeze II wintering over party. All extracted teeth will be preserved and studied from a histopathologic viewpoint. Studies will be made of the effects of Antarctic conditions on other aspects of oral health, such as (1) caries incidence in relation to diet, oral hygiene and stress, (2) changes in oral flora and (3) the relation of psychosomatic factors to dental complaints.

A rubber protective mouthpiece to insulate the teeth of men working outdoors will be tested. A study of the performance of amalgam, resin and cement silicate fillings from the standpoint of insulation, retention and discoloration will be made.

If time permits, three elective dental research projects will be undertaken, including studies of changes in plaque pH after a carbohydrate rinse in relation to a cold environment, studies of changes in the fluorescent patterns of the tongue as an indication of dietary deficiencies, and the collection and preservation of stimulated saliva for electrolyte determinations.

Parts of the program already completed include the training of medical officers assigned to isolated Antarctic bases in methods of treating dental emergencies, and the procurement and packing of all materials for carrying out the program.

General

S. LEVY, "MAN OF YEAR," NAMED DENTAL CHAIRMAN AT REESE

Recent recipient of the "Man of the Year" award, bestowed annually by the Alpha Omega dental fraternity, Saul Levy, former postgraduate studies coordinator at the University of Illinois, has been appointed chairman of the Department of Dentistry of Michael Reese Hospital Medical Center, Chicago.

The fraternity selected Dr. Levy for the award in recognition of his distinguished service to education, the dental profession and the fraternity. As postgraduate coordinator, he inaugurated and directed closed-circuit telephone and television courses given to 35,000 dentists in the United States and Canada over the past nine years. Dr. Levy will continue as consultant to this project.

The Michael Reese appointment is in line with the hospital's plans to develop a dental teaching and research program as well as instituting the intern and resident system in this field.

Saul Levy

W. R. ALSTADT TO ADDRESS DENTAL LABORATORIES GROUP

President-elect William R. Alstadt will be the featured speaker at the seventh annual meeting of the National Association of Dental Laboratories, to be held October 17-20 in Dallas.

Major topic of the four-day conference will be a proposed certification program for dental laboratory technicians. The proposal was developed during a series of conferences between representatives of the American Dental Association and the National Association of Dental Laboratories.

Nathan Cooper, Baltimore, president of the dental laboratories society, will preside.

C. A. KULP DIES; WAS ASSOCIATION CONSULTANT

Clarence A. Kulp, 61, internationally known insurance leader and a consultant to the Council on Dental Health of the American Dental Association, died on August 20 in Philadelphia. Dr. Kulp also was dean of the Wharton School of Finance and Commerce at the University of Pennsylvania. His reappointment as consultant by the Association's Board of Trustees had been requested by the Council.

SENIOR DENTAL STUDENTS COMPETE IN ESSAY CONTEST

Senior dental students in U. S. and Canadian schools are being invited to compete in the 1958 annual writing award competition sponsored by the American College of Dentists. Topic for the current contest is "Ethics in Dental Practice."

Now in its second year, this program was originated "to create reader interest, to stimulate the more widespread use of libraries and to develop competent dental writers."

Deadline for the submission of manuscripts is February 1, 1958. A cash award of $500 and a plaque will be presented to the author of the winning essay.

Further details about the contest may be obtained from O. W. Brandhorst, secretary, American College of Dentists, 4221 Lindell Blvd., St. Louis.

GROUPS IN DENTAL FIELD SCHEDULE MEETINGS

International Academy of Anesthesiology • Allentown Dental Hospital, Allentown, Pa., October 24. Three clinicians and an essayist will present a one-day seminar. Clinicians: Edward Weiner, S. S. Weinstock and Sidney S. Wagman. Essayist: Bernard Reis, "Anesthesia for the Ambulatory Patient."

New York Institute of Clinical Oral Pathology, Inc. • New York Academy of Medicine Building, October 28, 8:30 P.M. Essayist: Iago Galdston, "The Birth and Death of Specialties."

Pan American Odontological Association • Waldorf-Astoria Hotel, December 11, 7 P.M. Annual dinner meeting.

WOUND HEALING SUBJECT OF SMITH FOUNDATION SEMINAR

Two noted essayists and a moderator will participate in a three-day seminar on wound healing to be held December 8-11 at Karnack, Texas. Sponsored by the Rowe Smith Memorial Foundation, the purpose of this conference is to bring into focus the fundamental nature of the repair process and the role played by vitamins, minerals, hormones, protein and antimicrobial agents.

Featured essayists will be Dr. Edward L. Howes, associate clinical professor, College of Physicians and Surgeons, Columbia University, and Hamilton B. G. Robinson, associate dean of the College of Dentistry, Ohio State University. Moderator of the seminar will be E. Cheraskin, chairman of the department of oral medicine, University of Alabama School of Dentistry.

EASTMAN DISPENSARY ADDS PERIODONTOLOGY DEPARTMENT

Helmut A. Zander, former chairman of the division of periodontology at the University of Minnesota, has been appointed as head of the new periodontology department at Eastman Dental Dispensary, Rochester, N. Y.

COUNCIL ON DENTAL HEALTH

Budget payment plans for the individual purchase of dental care: II

In their early development, many budget payment plans are necessarily limited to the areas of component societies. Small plans of limited scope are simpler to design and develop than are district-wide or state-wide plans. Communications to the members of local societies are easier to manage, and difficulties arising in the operation of their plans are more readily understood and solved. Moreover, the responsibilities of the component dental society in the administration of the plan can be met through the efforts of volunteer personnel at little or no expense.

It is apparent, however, that successful plans developed through the efforts of local dental societies may be extended to the state level. The advantages of state-wide operation are definite:

1. The larger volume of financing allows more experimentation in the inclusion of desirable features to make the plan more effective and more attractive to the public, the dentist and the bank.

2. State-wide operation of a plan provides greater financial stability and minimizes the effects of economic changes in a single community, such as crop failures, major industrial changes or local disasters that could create local financial recessions which, in turn, might cause a single local budget plan to fail.

3. The volume of financing in a state-wide plan, ordinarily, will allow for the support of staff and space in the state dental society office, and, thus, the responsibilities of the dental society for the professional aspects of the plan can receive continuing and effective attention.

The plans which have shown the greatest development and success are those in which the dental society has assumed the ultimate control of the plan and assigns to the bank only those responsibilities which are specifically within the bank's competence. Plans completely within the control of the bank do not develop to their full potential for aiding in meeting the costs of dental care for a significant segment of the public—or they fail completely—because of lack of interest and enthusiasm on the part of the dentists.

4. A state-wide plan provides for uniformity of operation and simplifies its utilization by patients who move from one community to another.

DENTAL SOCIETY AGENCY IN CHARGE OF PLAN

The dental society should establish a specific agency to design, develop and operate its budget payment plan. The duties and responsibilities of the agency should be clearly defined and should be sufficiently comprehensive to allow:

1. A thorough study of the general subject of installment credit and of the particular area of budget payment for dental care.

This article is the second in a series of four to be published in subsequent issues of The Journal. The first appeared in the September issue.

2. A comprehensive study to determine the number of dentists in the dental society and in adjacent dental societies who are potential participants in a plan. This study should include a determination of the number of patients served in these practices and, if possible, the immediate reaction of the dentists and their patients to the use of a budget plan.

3. A survey of the banking institutions in the community to determine the interest of the banks in the plan and the adequacy of the bank's facility to develop and expand the plan.

4. The development of recommendations for basic policy on the design and operation of the plan and provision for the employment of legal or business counsel or both.

5. The authority to operate the budget payment plan under the established policy.

The title of the agency should indicate its importance and be commensurate with the extraordinary responsibilities it must fulfill in the dental society's business relationship with the bank and the public. Possible titles are "Budget Payment Plan Commission," "Board of Governors of Budget Payment Plan," "Trustees of Budget Payment Plan," "Committee on Budget Payment Program." In its inception and for purposes of initiating the plan, the agency should be composed of dental society members who have a demonstrated understanding of good business procedures and banking practices and whose professional stature and judgment are respected by the membership of the dental society. They should be willing to perform a real service to the dental society.

Until the budget plan is definitely established and its success assured, the membership of the governing board should be kept as stable as possible. After the plan has become well established and the basic policy for its continuing operation has been developed, provision should be made to bring new enthusiasm and ideas to the board. The new appointments should be staggered in order to attain a good distribution of enthusiasm and new experience in the membership of the board. The individual terms should be sufficiently long to allow the members to become oriented to their responsibilities and to make the maximum use of their experience. Where the budget plan is operated by a state society, the board membership should include district representation in order that the particular economic factors and other characteristics of the component districts may be given proper consideration in the operation of the plan.

The over-all operation of a budget plan must be the responsibility of the dental society and cannot be delegated to the bank if the plan is to be promoted to the public in the best interests of its dental health. The governing body of the budget plan should be charged with the full responsibility for operating the plan for the society under policies established by the society. It should make policy recommendations to the society for improving the operation of the plan as the need arises.

In its operation of the plan, the governing body should be responsible for dealing with the following problems:

1. Determination of eligibility of dentists to participate in the budget payment plan, certification of eligibility to the bank and establishment of rules on infractions under which the privilege of using the plan may be withdrawn; the actual withdrawal of privileges, and notification to the bank of loss of privilege.

2. Development of an effective educational program for members of the dental society in the use of the budget plan.

3. Periodic evaluation of the plan and negotiations with the bank for improving the efficiency of the plan's operation.

The governing body should make periodic studies of the utilization of the plan from the standpoint both of the percentage of members participating in the plan,

as well as the frequency of utilization, and of the percentage of patients in dental practices who are availing themselves of the services of the plan. Promotional material to improve both these areas of utilization should be given regular consideration.

SELECTION OF BANK

The successful experiences which banks have had in the financing of dental care through budget payment plans establish the fact that such plans constitute a sound banking practice. If the dental society has a well-prepared prospectus based on good studies of the number of people in the community who could participate in a plan and if these community statistics are supported with the experience data of existing plans, the society should have little difficulty in interesting banks in the development of such a plan. The plans which have been surveyed by the Council show: (1) the average note ranges from $225 to $260; (2) the loss ratio fluctuates between 1 and 2 per cent of the total dollar volume; (3) the average length of time in which notes are paid to the bank varies from 12 to 18 months. Plans reported show that loans may be extended for payment over variable periods of 3 to 24 months. These periods of payment vary according to the amount of the loan, the restrictions of the banking regulations and local custom.

The dental society should give consideration to the extent of budget payment operations conducted by the bank to be selected, its capacity for expanding the plan to adjacent communities by making its administration of the loss reserve mechanism available to other banks and its willingness to experiment in the pilot phase of the program in the interest of expanded service to the community. The dental society should consider not only the ability of the bank to administer the plan on a local basis in its initial phase but also its ability to expand the program through participating banks in other communities within the state as the plan grows and the demand for the service becomes state-wide.

After the decision has been made as to which bank will be responsible for the administration of the credit, it will be necessary to draw up the contracts between the dental society and the bank and between the bank and individual participating dentists and to develop the credit application and note forms for the patients.

MASTER CONTRACT

The initial instrument which will be required is the contract or agreement between the bank and the dental society. It is essential that the dental society's governing body for the plan be provided with highly competent legal assistance in the drawing up of this contract. Such an agreement should specify the responsibilities and prerogatives of the bank and those of the dental society. It should also stipulate the terms under which the financial support for the plan will be provided.

In states which provide for branch banking and a single bank has sufficient branches to service the entire area, it is relatively simple to arrange a master contract between the state dental society and the bank. This contract may be extended to cover individual agreements between individual dentists and the most conveniently located branch bank.

The absence of branch banking, however, does not preclude the establishment of state-wide plans. In Georgia, the master contract is written between the Citizens and Southern Banks and the Georgia Dental Association, making the C&S Banks the agent for the dental association in the administration of its loss reserve. In towns where there are no C&S banks, the dentists invite a local bank to participate in the budget plan by giving it access to the group security established by the state dental society's loss reserve.

These banks make their own individual evaluation of the credit applications as a further basis for extending credit.[4] Although the individual notes which establish the credit for the patient are created by the local banks and the credit is extended and recovered by them, the discount charged the dentist and the loss reserve are administered by the C&S Banks.

It is interesting to note the progress and development of the Georgia Dental Payment Plan in that it was originated by the Northern District Dental Society in 1948. At that time, the plan was available only through the C&S National Bank in Atlanta and to patients of members of the Northern District Dental Society. In 1954, availability of the plan on a statewide basis through banks in 46 cities was recommended by the Georgia Dental Association and became effective on April 1, 1955.

A budget payment plan in which all of the banks in the community participated was established by the Cincinnati Dental Society in 1955.[5] This arrangement makes it possible for a dentist or a patient to use the bank of his choice. Another feature of the plan makes the services of the local credit bureau available to all dentists participating in the plan.

The Cincinnati Dental Payment Plan operates under a contract between the four participating banks and the society, with each bank maintaining a loss reserve accumulated from the 4 per cent it withholds from the dentist's fee in loan transactions which it handles. The loss reserve, in each instance, is the property of the dental society. The plan specifies that there will be no recourse to the dentist for the debt of the patient.

To be eligible for participation in the plan, the dentist is required to be a member in good standing of the Cincinnati Dental Society and of the Credit Bureau of Cincinnati. Through an agreement between the society, the banks and the credit bureau, an educational program is conducted to familiarize the dentist with the plan.

In the event a patient's application for a loan is rejected, the dentist may obtain a credit report from the Credit Bureau of Cincinnati and determine if he wishes to extend the necessary credit. If he decides to extend credit, he will be assisted in collection of the account by the collection division of the credit bureau through provisions of his membership in the bureau.

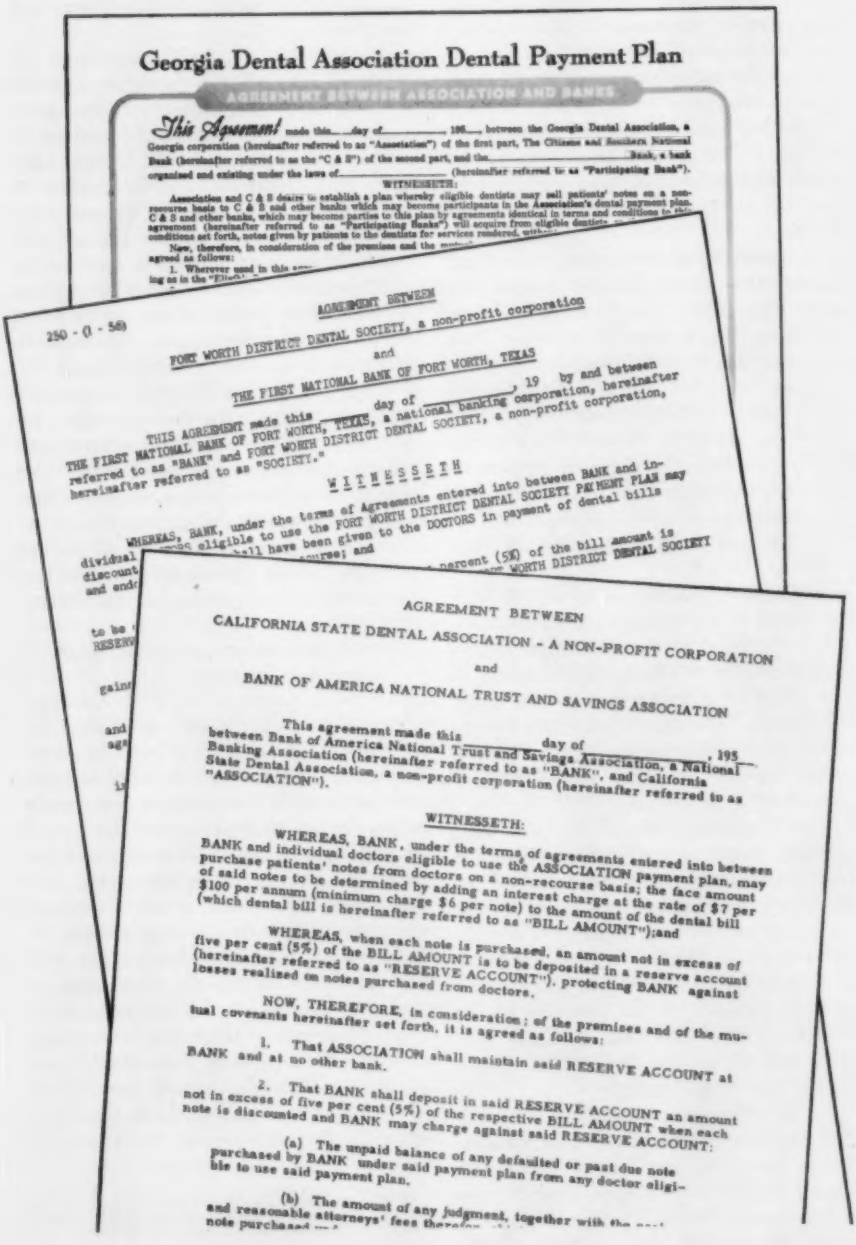
Illustrations of three contracts now in force for dental society plans are included herein. Complete copies, in mimeographed form, are available from the Council on Dental Health. These contracts demonstrate the fact that there are certain characteristics common to all bank budget payment plans, but they also reflect the individual requirements within different states. The variations in requirements may be due to the banking laws of the state or the characteristics of different dental societies within the same state.

INDIVIDUAL AGREEMENT BETWEEN BANK AND DENTIST

In addition to the master agreement between the dental society and its agent bank, it is necessary to establish individual contracts between dentists who desire to participate in the plan and the branch or participating banks through which the notes for credit are to be discounted. The individual agreement should stipulate the responsibilities and prerogatives of the bank in its individual transactions with the dentist as well as the responsibilities and prerogatives of the dentist in such transactions. As in the case of the master contract, the governing body should have capable legal assistance in the preparation of the individual contract form. Examples of individual agreement forms are in-

4. Georgia Dental Association Dental Payment Plan, John W. Yarbrough, secretary-treasurer, Georgia Dental Association, Southern United Bldg., Macon, Ga.

5. Cincinnati Dental Society, Herbert G. Frankel, chairman, credit bureau committee, Cincinnati Dental Society, 353 Doctors Bldg., Cincinnati.



Georgia Dental Association Dental Payment Plan

AGREEMENT BETWEEN ASSOCIATION AND BANKS

This Agreement made this ____ day of _____, 196__, between the Georgia Dental Association, a Georgia corporation (hereinafter referred to as "Association") of the first part, The Citizens and Southern National Bank (hereinafter referred to as the "C & S") of the second part, and the _____ Bank, a bank organized and existing under the laws of _____ (hereinafter referred to as "Participating Bank").

WITNESSETH:

Association and C & S desire to establish a plan whereby eligible dentists may sell patients' notes on a non-recourse basis to C & S and other banks which may become participants in the Association's dental payment plan, C & S and other banks, which may become parties to this plan by agreements identical in terms and conditions to this agreement (hereinafter referred to as "Participating Banks") will acquire from eligible dentists, ... conditions set forth, notes given by patients to the dentists for services rendered, with...

Now, therefore, in consideration of the premises and the ... agreed as follows:

1. Wherever used in this ... ing as in the "Ellis"...

250 - (1 - 58)

AGREEMENT BETWEEN

FORT WORTH DISTRICT DENTAL SOCIETY, a non-profit corporation

and

THE FIRST NATIONAL BANK OF FORT WORTH, TEXAS

THIS AGREEMENT made this ____ day of _____, 19 by and between THE FIRST NATIONAL BANK OF FORT WORTH, TEXAS, a national banking corporation, hereinafter referred to as "BANK" and FORT WORTH DISTRICT DENTAL SOCIETY, a non-profit corporation, hereinafter referred to as "SOCIETY."

W I T N E S S E T H

WHEREAS, BANK, under the terms of Agreements entered into between BANK and individual ... eligible to use the FORT WORTH DISTRICT DENTAL SOCIETY PAYMENT PLAN may discount ... have been given to the DOCTORS in payment of dental bills and endo... course; and

to be ... percent (5%) of the bill amount is RESERV... WORTH DISTRICT DENTAL SOCIETY

gains...

and ...

AGREEMENT BETWEEN

CALIFORNIA STATE DENTAL ASSOCIATION - A NON-PROFIT CORPORATION

and

BANK OF AMERICA NATIONAL TRUST AND SAVINGS ASSOCIATION

This agreement made this _____ day of _____, 195__ between Bank of America National Trust and Savings Association, a National Banking Association (hereinafter referred to as "BANK", and California State Dental Association, a non-profit corporation (hereinafter referred to as "ASSOCIATION").

WITNESSETH:

WHEREAS, BANK, under the terms of agreements entered into between BANK and individual doctors eligible to use the ASSOCIATION payment plan, may purchase patients' notes from doctors on a non-recourse basis; the face amount of said notes to be determined by adding an interest charge at the rate of $7 per $100 per annum (minimum charge $6 per note) to the amount of the dental bill (which dental bill is hereinafter referred to as "BILL AMOUNT");and

WHEREAS, when each note is purchased, an amount not in excess of five per cent (5%) of the BILL AMOUNT is to be deposited in a reserve account (hereinafter referred to as "RESERVE ACCOUNT"), protecting BANK against losses realized on notes purchased from doctors.

NOW, THEREFORE, in consideration of the premises and of the mutual covenants hereinafter set forth, it is agreed as follows:

1. That ASSOCIATION shall maintain said RESERVE ACCOUNT at BANK and at no other bank.

2. That BANK shall deposit in said RESERVE ACCOUNT an amount not in excess of five per cent (5%) of the respective BILL AMOUNT when each note is discounted and BANK may charge against said RESERVE ACCOUNT:

(a) The unpaid balance of any defaulted or past due note purchased by BANK under said payment plan from any doctor eligible to use said payment plan.

(b) The amount of any judgment, together with the ... and reasonable attorneys' fees ... note purchased ...

Copies of agreements between state dental societies and banks

CONTRACT #1

AGREEMENT BETWEEN

DR. _____

AND

BANK OF AMERICA NATIONAL TRUST AND SAVINGS ASSOCIATION

THIS AGREEMENT made this day of , 195 , by and between BANK OF AMERICA and DR. _____ of the State of California, hereinafter referred to as "DOCTOR".

W I T N E S S E T H:

WHEREAS, DOCTOR, a duly and regularly licensed and practicing dentist in the State of California, eligible to use the LOS ANGELES COUNTY DENTAL PLAN, does work for patients from time to time who DOCTOR notes in payment of their bills; and

AGREEMENT

To (Designate one)

_____ Central Trust Co.

_____ Provident Savings Bank & Trust Co.

_____ First National Bank

_____ Fifth Third Union Trust Co.

_____, 195

Gentlemen:

I am a duly licensed and regularly practicing dentist in the State of Ohio, a member in good standing of the Cincinnati Dental Society, and the Credit Bureau of Cincinnati, Inc., subject to the Society's rules and regulations to participate in the Society's Dental Plan, and I offer to sell to you (the bank designated above), from time to time, promissory notes (hereinafter called "notes") in payment of my bills.

Copies of individual agreements between participating banks and dentists

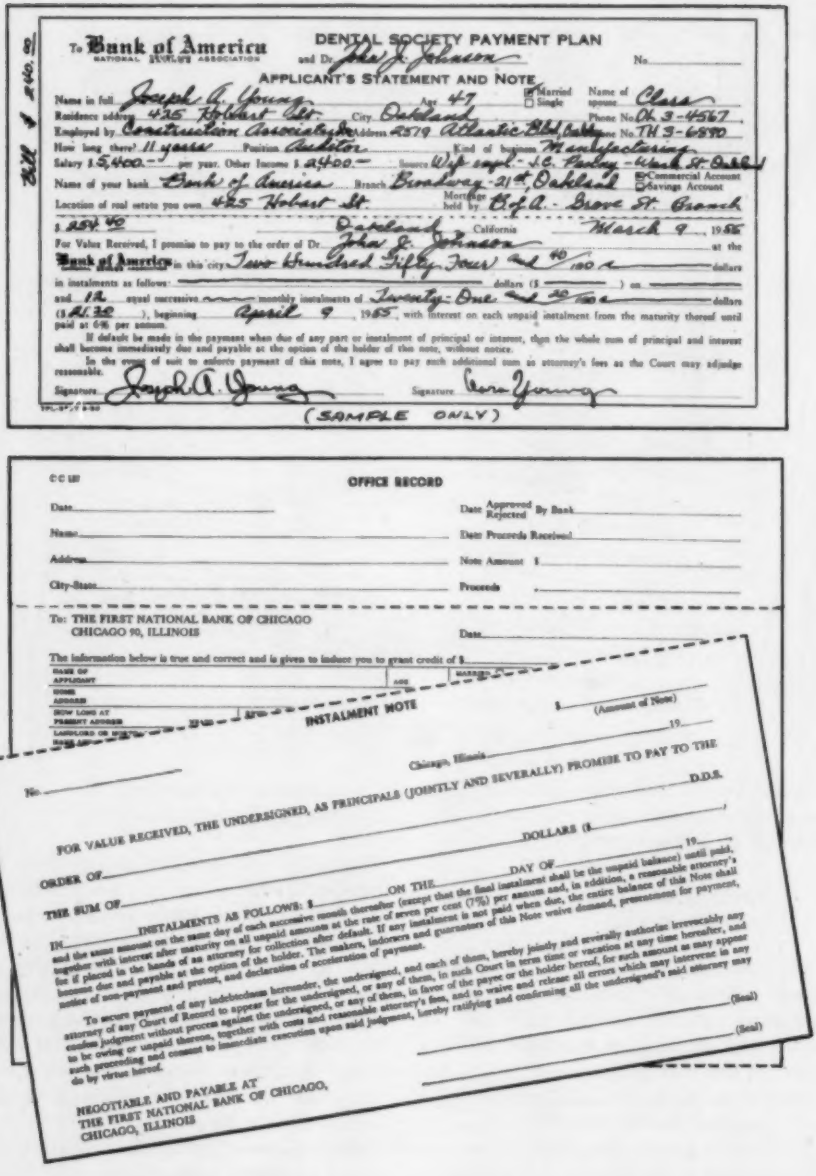
cluded herein, and mimeographed copies may be obtained from the Council on Dental Health.

CREDIT APPLICATION AND NOTE FORMS

The final instruments required to complete individual transactions between individual patients, dentists and bank are the credit application form and the note form. They may be prepared as separate items or as parts of a single form. They are furnished by the bank and should be available at the dentist's office to be completed there by the patient and forwarded by the dentist to the bank for processing. Examples of credit application and note forms are also shown.

ELIGIBILITY OF DENTISTS FOR PARTICIPATION IN PLAN

The budget plan is the responsibility of the dental society, and the loss reserve on which the plan is based is the property of the dental society. The society has the right to, and should, make membership in good standing a prerequisite to participation in the plan by a dentist. The governing body of the plan should insist that individual contracts between the bank or banks and the dentists be validated by the dental society before any credit is extended. Likewise, all banks holding individual contracts with dentists who have been dropped from membership in good standing must be notified of the withdrawal of privileges from the dentist.



DENTAL SOCIETY PAYMENT PLAN

To Bank of America NATIONAL TRUST & SAVINGS ASSOCIATION and Dr. John J. Johnson No.

APPLICANT'S STATEMENT AND NOTE

Name in full Joseph A. Young Age 47 ☑ Married ☐ Single Name of spouse Clara

Residence address 425 Hobart Str. City Oakland Phone No. OL 3-4567

Employed by Construction Associates Inc Address 2579 Atlantic Blvd, Oakland Phone No. TH 3-6890

How long there? 11 years Position Auditor Kind of business Manufacturing

Salary $ 5,400.- per year. Other income $ 2400.- Source Wife empl. - J.C. Penley - Wash St. Oakl.

Name of your bank Bank of America Branch Broadway - 21st Oakland ☑ Commercial Account ☐ Savings Account

Location of real estate you own 425 Hobart St. Mortgage held by B of A. - Grove St. Branch

$ 254.42 Oakland California March 9 1955

For Value Received, I promise to pay to the order of Dr. John J. Johnson at the Bank of America in this city Two Hundred Fifty Four and 42/100 dollars in instalments as follows dollars ($) on and 12 equal successive monthly instalments of Twenty-One and 20/100 dollars ($ 21.20), beginning April 9 1955 with interest on each unpaid instalment from the maturity thereof until paid at 6% per annum.

If default be made in the payment when due of any part or instalment of principal or interest, then the whole sum of principal and interest shall become immediately due and payable at the option of the holder of this note, without notice.

In the event of suit to enforce payment of this note, I agree to pay such additional sum as attorney's fees as the Court may adjudge reasonable.

Signature Joseph A. Young Signature Clara Young

(SAMPLE ONLY)

OFFICE RECORD

Date Date Approved or Rejected By Bank

Name Date Proceeds Received

Address Note Amount $

City-State Proceeds

To: THE FIRST NATIONAL BANK OF CHICAGO
CHICAGO 90, ILLINOIS

Date

The information below is true and correct and is given to induce you to grant credit of $

BANK OF APPLICANT | ACC | MARRIED OR SINGLE

HOME ADDRESS

HOW LONG AT PRESENT ADDRESS | RENT OR OWN

LANDLORD OR REAL ESTATE AGENT

INSTALMENT NOTE

No. Chicago, Illinois 19

$ (Amount of Note)

FOR VALUE RECEIVED, THE UNDERSIGNED, AS PRINCIPALS (JOINTLY AND SEVERALLY) PROMISE TO PAY TO THE ORDER OF D.D.S.

DOLLARS ($

THE SUM OF

IN INSTALMENTS AS FOLLOWS: $ ON THE DAY OF 19

and the same amount on the same day of each successive month thereafter (except that the final instalment shall be the unpaid balance) until paid, together with interest after maturity on all unpaid amounts at the rate of seven per cent (7%) per annum and, in addition, a reasonable attorney's fee if placed in the hands of an attorney for collection after default. If any instalment is not paid when due, the entire balance of this Note shall become due and payable at the option of the holder. The makers, indorsers and guarantors of this Note waive demand, presentment for payment, notice of non-payment and protest, and declaration of acceleration of payment.

To secure payment of any indebtedness hereunder, the undersigned, and each of them, hereby jointly and severally authorize irrevocably any attorney of any Court of Record to appear for the undersigned, or any of them, in such Court in term time or vacation at any time hereafter, and confess judgment without process against the undersigned, or any of them, in favor of the payee or the holder hereof, for such amount as may appear to be owing or unpaid thereon, together with costs and reasonable attorney's fees, and to waive and release all errors which may intervene in any such proceeding and consent to immediate execution upon said judgment, hereby ratifying and confirming all the undersigned's said attorney may do by virtue hereof.

(Seal)

(Seal)

NEGOTIABLE AND PAYABLE AT THE FIRST NATIONAL BANK OF CHICAGO, CHICAGO, ILLINOIS

Copies of credit application and note form

The governing body should develop policy relative to abuses of the plan by dentists that would constitute an undue burden on the plan's successful operation. The governing body must be prepared to adjudicate these abuses, provide the necessary instructions to prevent their recurrence and, where necessary, withdraw the privilege of participation from individual dentists who refuse to cooperate in the interest of the successful operation of the plan.

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

Dental fees in 1956

In a nation-wide survey of dental practice recently conducted by the Bureau of Economic Research and Statistics, information was obtained on several aspects of dental fees. The information was submitted by nearly 5,000 independent (nonsalaried) dentists, closely representative of all private practitioners in the United States.

FEE PRACTICES

Nationally, 10.7 per cent of the respondents answered "yes" to the question, "Do you regularly classify your patients according to income?" (Table 1). This practice was most prevalent in the Southeast (12.3 per cent) and least prevalent in the Northwest (7.9 per cent) and Far West (8.0 per cent).

Another question relating to dental fees was "Do you, as a regular practice, vary your fees according to the patient's ability to pay?" (Table 1). A little over one fourth (27.7 per cent) of all dentists reported they varied fees according to ability to pay. The seven regions did not differ greatly with respect to this practice.

For the nation as a whole, 58.9 per cent of the dentists reported they charged higher fees for adults than for children, 40.4 per cent charged the same and .7 per cent charged higher fees for children than for adults (Table 2). The question specified fees for extractions and two-surface fillings.

There were pronounced regional variations in percentage of dentists charging higher fees for adults than for children. This practice was most common in the Far West (74.8 per cent) and Northwest (74.2 per cent) and least common in the Southeast (39.9 per cent).

The practice of charging patients for appointments broken without advance notice was followed by 20.5 per cent of the respondents (Table 3). The median amount charged per broken appointment was $4. Regional variation in the prevalence of this practice was not large, the two extremes being the Southwest

Table 1 • Percentage of independent dentists reporting regular practice of classifying patients according to income and varying fees according to patient's ability to pay, by region

Region	Classify patients according to income	Vary fees according to ability to pay
New England	10.2	26.8
Middle East	11.4	28.9
Southeast	12.3	29.0
Southwest	9.3	26.9
Central	11.9	28.4
Northwest	7.9	24.9
Far West	8.0	25.4
United States	10.7	27.7

(15.0 per cent) and the Far West (24.8 per cent).

FEES FOR FIVE DENTAL SERVICES

The questionnaire, distributed in April 1956, asked the dentist to record current fees for five representative dental services. The percentage distributions of respondents according to fees charged for prophylaxes, one-surface amalgam fillings, single extractions, jacket crowns and complete upper dentures, are shown in Tables 4, 5 and 6. The most striking aspect of these fee distributions is the wide range of fees reported. For example, out of every hundred dentists, one charged only $2 for a prophylaxis, whereas about three charged $10 or more. Fees for a complete upper acrylic-base denture ranged from less than $50 to more than $300.

Fee averages, according to state and region, are shown in Table 7. National medians were $5 for prophylaxis; $4 for a one-surface amalgam filling; $4 for a single extraction (uncomplicated, with local anesthetic); $50 for an acrylic jacket crown, and $100 for a complete upper acrylic-base denture.

In Tables 7, 8, 9 and 10, a "composite fee" is given. The composite fee is the total fee for 10 prophylaxes, 30 one-surface amalgam fillings, 20 single extractions, one acrylic jacket crown and one complete upper acrylic-base denture. These weights represent the approximate relative frequency of these five services for the average dentist in the United States. Thus, the composite fee is an accurate index of the general fee level by state, age group and so forth.

The composite fee was computed for each respondent who answered all five fee questions. It differs slightly from the weighted sum of the individual fee averages given in Table 7 because of the fact that some dentists entered fees for less than five services.

In terms of the mean composite fee, the seven regions ranked as follows: (1) Far West ($537.10); (2) Southwest ($423.30); (3) Middle East ($417.46); (4) Central ($392.12); (5) New England ($388.65); (6) Northwest ($381.97), and (7) Southeast ($367.09). Among the 32 individual states from which enough replies were received for reliable statistics, California's composite fee of $563.40 was highest (Table 7). The other extreme was represented by West Virginia ($330.17), Kentucky ($331.03) and North Carolina ($333.14). Thus, dental fees are about 70 per cent higher in California than in West Virginia, Kentucky and North Carolina.

Dentists 25 to 29 years of age reported a relatively low mean composite fee of $383.91 compared to the mean of $416.63 for all respondents (Table 8). The mean increased with each higher age group until a peak was reached at age 45 to 49 ($433.72). Thereafter, the mean decreased with each higher age group. The decrease was slight in the fifties but substantial in the older age groups. Dentists over 70 years of age reported a mean composite fee of approximately $350.

The mean composite fee for dentists in places of less than 1,000 population was $308.91, compared to the national average of $416.63 (Table 9). With each larger city-size category, there was an increase in the mean composite fee. The highest figure, $467.67, was reached in cities of over 1,000,000 population.

An examination of the mean composite fees for particular cities listed in Table 9 reveals that the figure for cities of over 1,000,000 population would have been lower than the figure for cities of 500,000 to 1,000,000 except for the influence of Los Angeles, whose mean of $617.54 was much higher than the means of the other four cities in the "over 1,000,000" category, New York, Chicago, Philadelphia and Detroit.

Dentists were asked to check one of four given statements describing various degrees of busyness during the preceding

Table 2 • Percentage distribution of independent dentists according to relationship of fees charged for extractions and two-surface fillings provided for adults and children, by region

Region	Same fee for adults and children	Higher fee for adults	Higher fee for children
New England	47.5	52.5	0.0
Middle East	46.6	52.2	1.2
Southeast	58.9	39.9	1.2
Southwest	49.1	49.8	1.1
Central	35.6	64.0	.4
Northwest	25.5	74.2	.3
Far West	24.6	74.8	.6
United States	40.4	58.9	.7

Table 3 • Percentage of independent dentists charging patients for appointments broken without advance notice and average fee charged for a broken 30-minute appointment, by region

Region	Per cent of dentists	Mean fee	Median fee
New England	23.8	$3.68	$3.00
Middle East	17.2	4.24	4.00
Southeast	18.5	3.95	3.00
Southwest	15.0	3.83	3.00
Central	22.4	3.80	3.00
Northwest	19.6	3.65	3.00
Far West	24.8	4.75	5.00
United States	20.5	4.07	4.00

Table 4 • Percentage distribution of independent dentists according to fees charged for dental prophylaxis, one-surface amalgam filling, and single extraction (uncomplicated, with local anesthetic)

Fee	Prophylaxis	Amalgam filling	Extraction
Under $2.00	.2	.3	.2
2.00	1.0	1.4	3.6
2.50	.1	.4	.2
3.00	11.1	19.3	26.5
3.50	.3	.9	.2
4.00	21.8	37.8	21.8
4.50	.1	.5	.0
5.00	39.9	24.5	35.7
5.50	.1	.1	.0
6.00	12.8	7.4	5.1
6.50	.1	.0	.0
7.00	5.2	2.3	2.3
7.50	.5	.3	.3
8.00	3.3	2.3	1.7
9.00	.2	.4	.0
10.00	2.6	1.7	2.2
More than 10.00	.7	.4	.2
Total	100.0	100.0	100.0

Table 5 • Percentage distribution of independent dentists according to fee charged for acrylic jacket crown

Fee	Per cent
Under $15	.5
$15—19	1.0
20—24	1.6
25—29	4.7
30—34	5.5
35—39	11.0
40—44	15.0
45—49	8.7
50—54	26.1
55—59	2.8
60—64	10.0
65—69	4.2
70—74	.7
75—79	6.1
80—84	.5
85—89	.5
90 and more	1.1
Total	100.0

Table 6 • Percentage distribution of independent dentists according to fee charged for complete upper acrylic-base denture

Fee	Per cent
Under $ 50	.9
$ 50— 59	2.5
60— 69	6.4
70— 79	17.7
80— 89	10.3
90— 99	7.8
100—109	20.9
110—119	3.3
120—129	13.5
130—139	1.2
140—149	.7
150—159	9.5
160—169	.3
170—179	1.2
180—189	.3
190—199	.1
200—209	1.6
210—and more	1.8
Total	100.0

Table 7 • Average fees reported by independent dentists, by region and state

Region and state	Dental prophylaxis		Amalgam filling for one-surface cavity		Single extraction (uncomplicated, with local anesthetic)		Acrylic jacket crown		Complete upper acrylic-base denture		Composite fee	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
NEW ENGLAND	$4.31	$4.00	$3.96	$4.00	$4.35	$4.00	$42.77	$40.00	$100.07	$100.00	$388.65	$385.00
Connecticut	4.73	5.00	4.31	4.00	4.81	5.00	48.04	50.00	116.34	122.50	435.00	425.00
Maine	*	*	*	*	*	*	*	*	*	*	*	*
Massachusetts	4.30	4.00	4.03	4.00	4.45	4.00	43.65	45.00	101.28	100.00	393.09	385.00
New Hampshire	*	*	*	*	*	*	*	*	*	*	*	*
Rhode Island	*	*	*	*	*	*	*	*	*	*	*	*
Vermont	*	*	*	*	*	*	*	*	*	*	*	*
MIDDLE EAST	4.86	5.00	4.69	4.00	4.58	5.00	50.08	50.00	111.98	100.00	417.46	410.00
Delaware	*	*	*	*	*	*	*	*	*	*	*	*
Dist. of Col.	*	*	*	*	*	*	*	*	*	*	*	*
Maryland	4.67	5.00	4.08	4.00	4.20	4.00	47.19	50.00	109.91	100.00	403.29	395.00
New Jersey	5.09	5.00	4.73	5.00	5.14	5.00	55.28	50.00	119.15	120.00	460.68	450.00
New York	5.12	5.00	4.58	4.00	4.95	5.00	52.50	50.00	119.39	110.00	437.86	425.00
Pennsylvania	4.13	4.00	3.65	4.00	3.64	3.00	44.07	40.00	93.36	85.00	355.20	345.00
W. Virginia	4.36	5.00	3.71	4.00	3.10	3.00	*	*	80.37	75.00	330.17	335.00
SOUTHEAST	4.77	5.00	4.03	4.00	3.82	3.00	41.88	40.00	85.24	75.00	367.09	365.00
Alabama	4.89	5.00	4.02	4.00	3.50	3.00	39.23	40.00	76.49	75.00	347.87	340.00
Arkansas	*	*	*	*	*	*	*	*	*	*	*	*
Florida	5.38	5.00	4.84	5.00	4.91	5.00	47.68	50.00	113.40	100.00	442.24	424.00
Georgia	4.63	5.00	4.09	4.00	3.88	4.00	43.45	40.00	85.00	75.00	371.95	380.00
Kentucky	4.52	5.00	3.68	3.50	3.16	3.00	39.18	40.00	73.38	65.00	331.03	325.00
Louisiana	4.49	5.00	4.17	4.00	4.07	4.00	42.68	45.00	88.10	75.00	385.89	390.00
Mississippi	*	*	*	*	*	*	*	*	*	*	*	*
No. Carolina	4.38	4.00	3.65	4.00	3.48	3.00	39.86	40.00	71.18	65.00	333.14	320.00
So. Carolina	*	*	*	*	*	*	*	*	*	*	*	*
Tennessee	4.61	5.00	3.91	4.00	3.56	3.00	40.17	40.00	78.19	75.00	357.06	350.00
Virginia	4.81	5.00	3.93	4.00	3.96	4.00	45.32	45.00	92.61	85.00	378.93	375.00
SOUTHWEST	5.94	5.00	4.80	5.00	4.40	5.00	47.33	50.00	97.41	92.00	423.30	425.00
Arizona	*	*	*	*	*	*	*	*	*	*	*	*
New Mexico	*	*	*	*	*	*	*	*	*	*	*	*
Oklahoma	5.02	5.00	4.36	4.00	3.87	4.50	43.45	45.00	85.40	75.00	386.45	370.00
Texas	6.16	5.00	4.84	5.00	4.50	5.00	48.08	50.00	99.61	95.00	427.94	425.00

Region and state	Dental prophylaxis		Amalgam filling for one-surface cavity		Single extraction (uncomplicated, with local anesthetic)		Acrylic jacket crown		Complete upper acrylic-base denture		Composite fee	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
CENTRAL	$4.74	$5.00	$4.16	$4.00	$3.97	$4.00	$45.68	$45.00	$ 99.96	$ 90.00	$392.12	$385.00
Illinois	4.91	5.00	4.53	4.00	4.42	4.00	47.18	45.00	109.88	100.00	425.08	415.00
Indiana	4.92	5.00	4.38	4.00	3.81	4.00	41.82	40.00	91.82	85.00	378.81	370.00
Iowa	4.23	4.00	4.03	4.00	3.38	3.00	41.19	45.00	87.94	80.00	362.61	355.00
Michigan	5.28	5.00	4.26	4.00	4.18	4.00	48.29	50.00	100.32	90.00	405.90	395.00
Minnesota	4.47	5.00	3.87	4.00	3.52	3.00	47.03	50.00	89.94	88.00	366.36	360.00
Missouri	4.49	4.00	3.95	4.00	3.87	3.00	39.75	38.00	100.11	95.00	367.13	350.00
Ohio	4.68	5.00	4.02	4.00	4.02	4.00	46.20	45.00	103.30	100.00	396.88	395.00
Wisconsin	4.28	4.00	3.78	4.00	3.56	3.00	45.39	45.00	94.47	90.00	361.22	360.00
NORTHWEST	5.06	5.00	4.16	4.00	3.92	4.00	40.44	40.00	94.16	85.00	381.97	375.00
Colorado	6.77	6.00	4.89	5.00	4.66	4.50	44.23	45.00	111.90	100.00	437.64	410.00
Idaho	*	*	*	*	*	*	*	*	*	*	*	*
Kansas	4.56	5.00	3.80	4.00	3.97	4.00	36.55	35.00	84.70	75.00	366.15	355.00
Montana	*	*	*	*	*	*	*	*	*	*	*	*
Nebraska	4.46	4.00	4.13	4.00	3.69	3.00	35.43	35.00	94.30	79.50	358.58	350.00
No. Dakota	*	*	*	*	*	*	*	*	*	*	*	*
So. Dakota	*	*	*	*	*	*	*	*	*	*	*	*
Utah	4.92	5.00	3.83	4.00	4.11	4.00	*	*	*	*	*	*
Wyoming	*	*	*	*	*	*	*	*	*	*	*	*
FAR WEST	6.42	6.00	6.01	6.00	5.72	5.00	57.22	55.00	125.54	125.00	537.10	515.00
California	6.47	6.00	6.36	6.00	6.12	6.00	59.96	60.00	132.32	125.00	563.40	540.00
Nevada	*	*	*	*	*	*	*	*	*	*	*	*
Oregon	6.04	6.00	4.70	4.50	4.47	5.00	46.58	50.00	105.50	100.00	433.55	435.00
Washington	6.47	6.00	5.45	5.00	4.91	5.00	50.78	50.00	109.72	100.00	475.56	470.00
UNITED STATES	5.09	5.00	4.58	4.00	4.40	4.00	47.52	50.00	104.45	100.00	416.63	405.00

*Too few replies for reliable statistics.

Table 8 • Average composite fee reported by independent dentists, by age

Age	Mean	Median
25–29	$383.91	$385.00
30–34	403.30	395.00
35–39	412.18	400.00
40–44	427.32	420.00
45–49	433.72	415.00
50–54	432.07	415.00
55–59	431.99	405.00
60–64	416.10	400.00
65–69	415.63	375.00
70–74	356.80	375.00
75–	346.75	320.00
All ages	416.63	405.00

Table 9 • Average composite fee reported by independent dentists, by size of city and for seven large cities

City size or city	Mean	Median
Under 1,000	$308.91	$305.00
1,000–2,500	335.51	320.00
2,500–5,000	348.90	340.00
5,000–10,000	376.49	360.00
10,000–25,000	402.07	385.00
25,000–50,000	421.30	405.00
50,000–100,000	433.64	415.00
100,000–250,000	444.98	430.00
250,000–500,000	445.17	430.00
500,000–1,000,000	452.72	440.00
Over 1,000,000	467.67	440.00
All city sizes	416.63	405.00
New York	455.36	435.00
Chicago	448.64	435.00
Philadelphia	366.89	350.00
Los Angeles	617.54	585.00
Detroit	444.42	430.00
Cleveland	435.00	425.00
San Francisco	564.69	540.00

year. The average composite fee according to practice busyness is given in Table 10. The lowest composite fee ($404.87) was reported by the busiest dentists, whereas the least busy dentists were a close second ($406.54). The highest composite fee ($425.88) was reported by dentists who had a "good balance" between the demand for dental services and their ability to meet the demand.

The median fee for an extraction was $4 for general practitioners and $5 for oral surgeons. The median fee for a complete upper denture was $100 for general practitioners and $120 for prosthodontists. The mean composite fee was $433.16 for dentists in partnerships, $425.16 for dentists without partners who shared costs of offices or personnel and $414.67 for dentists without partners and with no sharing of costs.

Table 10 • Average composite fee reported by independent dentists, according to busyness of practice during the year 1955

Busyness of practice	Mean	Median
Because of the length of your appointment list, some persons who contacted you for dental care actually obtained this care from another dentist.	$404.87	$390.00
You provided dental care for all who requested appointments, but you felt more rushed and worked more hours than you would have liked.	416.05	400.00
There was a good balance between the number of persons who contacted you for dental care and your ability to provide this care.	425.88	410.00
You did not have as many patients as you would have liked.	406.54	400.00
All independent dentists	416.63	405.00

SUMMARY

More than one fourth of dentists in private practice regularly varied their fees according to the patient's ability to pay, although only one tenth systematically classified their patients according to income. Six of every ten dentists charged higher fees for adults than for children, although the proportion varied from about two fifths in the Southeast to about three fourths in the Northwest and Far West. Only one fifth of all dentists followed a practice of charging patients for appointments broken without advance notice. The median charge per broken appointment was $4.

Very wide variation was reported in fees charged for five dental services. For each service the highest fee reported was at least ten times the lowest fee. The "composite fee," an index of general fee level, indicated that dentists in the Far West charged considerably higher fees than dentists in other regions, followed in order by the Southwest, Middle East, Central, New England, Northwest and Southeast.

The mean composite fee for dentists aged 25 to 29 was considerably lower than that for dentists of all ages. It increased gradually with age through age 45 to 49; thereafter a decline set in, and the lowest mean was for the oldest dentists. By city size, lowest fees were reported in the smallest places and highest fees in the largest places, although some of the largest cities had lower fees than would be expected from this pattern. Differences in fees according to dentist busyness were not great. The busiest dentists—those who could not accommodate all would-be patients, reported the lowest average composite fee.

COUNCIL ON DENTAL RESEARCH

Registry of Dental and Oral Pathology

A number of services are available to the Association membership through the Registry of Dental and Oral Pathology of the American Dental Association. This activity functions as part of the American Registry of Pathology at the Armed Forces Institute of Pathology, Washington, D. C.

Services and materials available include the following:

Consultation on diagnoses requiring microscopic interpretation.

Assistance in preparing, editing and illustrating manuscripts on subjects relating to oral pathology.

Training programs for board candidates, teachers and practitioners.

Loan materials:

Microscopic slide set (100 slides and brochure).

Microscopic slide set (50 slides and brochure).

Kodachrome study sets (clinical pictures—5 categories of 100 each).

Lesions of jaw bones (roentgen-ray study set).

Radiation effect (25 micro slide study set).

Atlas of Oral Pathology (sale item).

Teaching materials in oral pathology for dental schools.

Source information on dental and oral diseases, such as effectiveness of treatment patterns, incidence and etiology.

Further information can be obtained from Joseph L. Bernier, Registrar, Armed Forces Institute of Pathology, Washington 25, D. C.

BUREAU OF LIBRARY AND INDEXING SERVICE

The American Dental Association Film Library

The film, "Rehabilitation of Patients with Clefts of Lip and/or Palate," reviewed in this article, is one of the films recently acquired which can be rented for $2.50 from the Film Library. It will appear on the ninety-eighth annual session motion picture program, Tuesday, November 5, at 3:55 P.M in the Dinner Key Auditorium, Room E, Miami, Fla.

The new series of slides for professional use only, "Treatment of Posterior Crossbite," can be rented from the Film Library, 222 E. Superior St., Chicago, for $1.50. Additional films and slides on these subjects and films and slides on other subjects are listed in the booklet, *Audio-Visual Materials in Dentistry,* and its supplement, which are available free of charge from the Film Library.

FILM REVIEW

Rehabilitation of Patients with Clefts of Lip and/or Palate. 16 mm., color, sound, 30 minutes. Produced in 1954 by William H. Olin, D.D.S., D. M. Lierle, M.D., and W. C. Huffman, M.D., for the Department of Otolaryngology, University Hospitals, Iowa City. Photography by Bureau of Audio-Visual Instruction, State University of Iowa. Can be purchased ($175) from the producers.

The film acquaints students and laymen interested in cleft palate rehabilitation with the functions of a cleft palate center; explaining a complete rehabilitation program for patients with clefts of the lip, palate or both. The film opens with an instructor explaining the nature of clefts to a group of dental students. His lecture is illustrated by drawings showing the development of the embryo in the first two and a half months of pregnancy at which time the roof of the mouth is developed. Drawings of a normal lip are compared with a cleft lip. In the next sequences patients with unilateral clefts, bilateral clefts, cleft palate, cleft of the uvula and soft palate and a combination cleft lip and palate with a complete cleft extending through the alveolar ridge are shown. The narrator states that in one of every 699 births cleft palate occurs, and that the condition is more prevalent in males than in females.

The next sequence shows the surgical correction of a child's cleft lip and palate. This is followed by evaluation and treatment of various patients in the cleft palate center. The narrator explains that palatal surgery is performed on a child after the fourth year. Special equipment which is necessary for feeding such infants is then demonstrated by a nurse. Speech correction and some form of orthodontic treatment are also included in the treatment of such children. The next sequences show a child and an adult surgically treated for the correction of cleft palates fitted with obturators. They demonstrate their speech with and without the obturator. The film concludes with a summary by the instructor to the group of dental students seen in the initial scene.

The film is well organized. The photography is good. The instructional value of the film could be increased if the obturator construction technic were shown. It is suitable for first and second year dental students and dental hygienists as an introduction to the subject of cleft lip and palate. Dental and medical staffs at hospitals, speech pathologists, general practitioners, pedodontists, maxillofacial surgeons, orthodontists, and prosthodontists may find it interesting material for staff training and dental society meetings. Since it shows the relation of the dentist to the other professions and the teamwork necessary in the treatment of patients with cleft lips and palates, it would also be suitable for the public.

SLIDE REVIEW

S39 Treatment of Posterior Crossbite. 2 x 2 slides, 76 color, 13 black and white, 89 slides with guide. Produced in 1957 by Paul Grindlinger, D.D.S., Howard M. Grindlinger, D.D.S., and Leonard Gorelick, D.D.S., Kew Gardens, L. I., New York. (For professional groups only.) Individual slides, ($.55 each for black and white or $1 each for color) or the entire set ($83.15) can be purchased from

the Order Department of the American Dental Association, 222 E. Superior St., Chicago 11, Ill.

According to the authors, this presentation on the treatment of posterior crossbite is adapted for those interested in tooth movement, whether as an aid in periodontal treatment, part of full mouth rehabilitation or in preventive orthodontics. A knowledge of band forming, welding and soldering technic, familiarity with the Hawley retainer type of appliance and an understanding of the theory and practice of tooth movement are assumed. "The primary purpose of this slide series is to present some of the analytic methods and criteria used to distinguish the relatively simple case from the complex one and the troublefree from the inevitably troublesome."

The first 13 slides are concerned with prognosis. Each of the following criteria, (1) axial inclination, (2) degree of posterior overbite, (3) amount of available space, (4) centric relation or functional analysis, and (5) growth, is dealt with separately in detail. Slides 14 through 45 show various methods of correction, including the modified Hawley appliance. Slides 45 to 50 show a midline deviation and a midline correction through the removal of the functional interference. Slides 51 through 59 show various patients with slight posterior crossbites but with tremendous open bites. Cephalometric analyses are also included. Slides 60 to 69 are concerned with the relation between posterior deciduous teeth in crossbite and the underlying permanent teeth. Slides 70 through 89 deal with treatment procedures in specific instances which include modified Hawley retainers, "S" elastics, splints, finger springs, labial and lingual appliances.

This series of slides is well organized. The guide which accompanies them gives a detailed explanation of each slide. These are for professional groups only. Dental study clubs, hospital dental staffs and Armed Forces personnel may find them instructional.

Book Reviews

LA ODONTOLOGIA NORTEAMERICANA (NORTH AMERICAN DENTISTRY)

By Jose Font Llorens, Doctor in Medicine and Dentistry. 96 pages with 11 illustrations. No price listed. Barcelona, Spain, Grafica Fomento, 1956.

A widely traveled and prominent Spanish dentist reports on American dentistry in this comprehensive and accurate study and concludes that the spirit of organized cooperation and directness of action which characterize it have placed and keep the profession in its present position of world leadership.

The volume was written after the author's recent visit to ten cities in the United States. Its first chapter gives a general outline of dentistry in this country in its different activities: societies, meetings, publications, teaching, research, private and institutional practice. Four chapters deal with the prevailing theories and technics in oral surgery, endodontics, oral medicine, pedodontics, orthodontics and prosthodontics. One chapter reviews the present thought in America on the etiology, prophylaxis and restorative treatment of dental caries.

The author's simple and direct style, accompanied by illustrations reprinted from American publications, makes easy reading for those acquainted with the Spanish language.

George French

DEUTSCHER ZAHNÄRZTE KALENDER 1957 (ALMANAC FOR GERMAN DENTISTS 1957)

Edited by Ewald Harndt. Sixteenth edition. 354 pages with 129 illustrations. Index. DM 16. Munich, Carl Hanser Verlag, 1957.

Attractive in appearance, excellently edited, printed and illustrated, the sixteenth edition of this German dental yearbook consists of 29 contributions by distinguished German specialists in different fields of dentistry.

The following contributions seem especially outstanding: (1) "The Displaced Tooth," by Josef Heiss; (2) "Diseases of the Temporomandibular Joint," by Erwin Reichenbach and F. Bräse; (3) "Anesthesia in Pedodontics," by Werner Oertel; (4) "Diseases of the Blood and Their Importance in Dental Practice," by Erwin Reichenbach and Herbert Mehnert; (5) "Halitosis: Cause and Treatment," by Theodor Kirsch; (6) Symptoms, Causes and Treatment of the So-called Denture Stomatitis," by Horst Uhlig; "Natural Form, Color and Arrangement of Anterior Teeth in Removable Bridges," by Hans van Thiel; (7) "Beginning and Duration of Orthodontic Treatment," by Dorothea Neumann; (8) "Failures in Endodontic Treatment and Their Causes," by J. Franke; (9) "Acrylic Resin as a Filling Material," by J. Kluczka, and (10) "Interpretation of Intraoral Roentgenograms," by Werner Hielscher.

This book can be recommended to dentists and dental students who want to keep up with what is happening in German dentistry and dental research.

Paul H. Glucksman

SULFONAMIDE UND ANTIBIOTIKA IN DER ZAHN-, MUND- UND KIEFERHEILKUNDE (SULFONAMIDES AND ANTIBIOTICS IN DENTISTRY)

By Prof. Herbert Harnish. Second edition. 110 pages with 41 illustrations. Bibliography. Index. DM 12.60. Munich, Carl Hanser Verlag, 1956.

The author is a famous German dental scientist who has had wide clinical experience with antibiotic and chemotherapeutic drugs used in dental practice. This paperbound booklet is issue number five of the series *Monographs on Dental Subjects*, edited by Prof. H. H. Rebel and P. Jaeger.

The book is divided into three short parts as follows: (1) history of chemotherapy and description of manner of action, pharmacologic properties, dosage, methods of application of sulfonamides, antibiotics and antibiotic-vitamin mixtures, and penicillin and allergy tests; (2) oral conditions and operative procedures in which sulfonamide or antibiotic treatment is used, and (3) combined treatments, laboratory aspects, complications encountered during and after antimicrobial treatments in dental practice and comments concerning the management of these complications.

This book should prove useful to the dental practitioner and student who is able to read German. It is neither a textbook nor a reference work and contains little data which would interest a researcher.

The references listed are selected on the basis of their importance or historical interest.

However, many foreign authors who have contributed much to research and development of antibiotics are omitted.

Scattered throughout this book are quotations from eminent, mainly German, scientists. These "pearls of wisdom" are pleasing but do not add greatly to the usefulness of the work.

This book contains a valuable appendix which lists the chemotherapeutic agents together with their German trade names and indications for their use. In meeting the need for such an information, this unpretentious monograph can do much good.

Paul H. Glucksman

NERVENREGENERATION UND TROPHIK (NERVE REGENERATION AND TROPHIC INFLUENCES)

By M. L. Borowski. 195 pages with 77 illustrations. DM. 20. Jena, Gustav Fischer, 1956.

This is a research report recently translated from the original Russian publication of 1952. It is an account of experimental work done by Borowski and his co-workers in the Russian Institute for General and Experimental Pathology of the Academy of Medical Sciences of the USSR.

The first part, in six chapters, describes experimental morphologic studies in which intact and interrupted sciatic nerves of rabbits were injected with 6 mg. of vitamin B_1. In nonsectioned nerves, pathologic changes were noted in the lumbosacral segments and even on the intact (contralateral) side of the body, whereas injections of peripheral or proximal stumps of cut nerves led to pronounced dystrophies and even death of the animals. Pathologic changes were noted earlier in sensory than in motor nerves. The finding of widespread pathology after local treatment is given in support of Pavlov's notion of a pathologic nervous reflex mechanism. Part two (two chapters) covers clinico-physiologico-morphologic studies on patients and pieces of nerves removed in surgical operations; part three (one chapter) considers nerve regeneration and the trophic (beneficial, nutritive) functions of nerve. The experimental results would be far more conclusive and convincing if they had been done on larger numbers of animals and with adequate controls. The halftone reproductions of photomicrographs are, in general, of poor quality.

The summary proves to be not so much a recapitulation of salient features of the research as a rather long, plodding review of the Russian literature. Foreign (non-Russian) countries are criticized not only for failing to develop a "settled, harmonious, materialistic doctrine" concerning the trophic role of the nervous system, but also for ceasing to work on the problem. The reason advanced to explain this is the "ideologic influence of reactionary theories which prevail in philosophy and natural science." One reads that in "capitalistic countries" work on the trophism of nerves is not progressing, but has even stopped—at present "nothing at all is being accomplished." The literature citations would seem to bear out such statements. As against 134 references to Russian articles, only 10 works in the English language and 16 in French and German are mentioned. The Russian references are given also in German.

The neurologist, neurophysiologist and neurosurgeon will find in this a rather thorough, if biased discussion of the concept of the trophic influence of the nervous system on the body as a whole and its biodynamic processes.

Vernon E. Krahl

ENCYCLOPÉDIE LAROUSSE MÉTHODIQUE (SYSTEMATIC ENCYCLOPEDIA LAROUSSE)

Edited by Paul Augé. Two volumes. 2,380 pages with 25,600 illustrations, 1,060 maps and etchings, 55 in multicolor. Index. 12,775 Fr. franc. Paris, Librairie Larousse (Augé, Gillon, Hollier-Larousse, Moreau & Cie.), 1956.

This two-volume encyclopedic work is the result of new lexicographic ideas and editorial methods that have changed completely the appearance of this newest publication of the renowned French publishers of encyclopedias, dictionaries, travel guides and textbooks.

The 138,423 articles, written by famous French contributors, do not appear in the customary alphabetic order, but are arranged in 23 separate chapters.

Volume 1 contains the following topics: geography, history, religion and mythology, philosophy, French and international law, military organization, literature, art and history of art, music and history of music.

Volume 2 consists of the following subjects: arithmetic, algebra, geometry, mechanics, natural sciences, medicine and dentistry, veterinary medicine, agriculture, sports and games.

This unique arrangement results in an uneven and frequently sketchy coverage. Nevertheless, the pleasant and lucid way of pres-

entation assists in fulfilling the primary objective of this reference work which is to form a bridge between the thinking of editors and collaborators and that of the readers. For this reason, this encyclopedia seems to be as good as, if not better than, the majority of the small general reference works published in the United States.

In format, typography and binding, this work is a fine example of the products of the French publishing industry. Its comparatively high price, however, puts it virtually beyond the purchasing power of the average American reader. The new *Encyclopedia Larousse* should find a definite place in public and school libraries.

Jean P. Lanion

GESICHT, GESICHTSSCHÄDEL, KIEFER
(FACE, SKULL, JAWS)

By K. E. Herlyn, R. Ritter, A. Rosenthal, E. Walser and R. Zenker. 815 pages with 895 illustrations, many in color. Complete table of contents in outline form. Index. DM. 318. Berlin, Springer-Verlag, 1956.

This fourth volume of the monumental ten-volume series on general and special surgical operations *(Allgemeine und spezielle chirurgische Operationslehre)*, edited by N. Guleke and R. Zenker, will be of especial interest and value to the dental practitioner and the maxillofacial surgeon.

The thoroughness with which the authors have covered their several fields is indicated by the closely spaced table of contents which covers ten pages. Only major headings can be mentioned here.

Each of the five contributors has written a section on his particular specialty. The first section by Ritter covers local anesthesia, dental extractions of simple and difficult types, apical resections, reimplantation, extirpation of dentigerous and dermoid cysts, abscesses of bone and soft tissues, osteomyelitis, jaw fractures, diseases of the temporomandibular joint, surgical-orthopedic treatment of mandibular anomalies, injuries of and plastic procedures on the lips, jaws, cleft lip and palate (including obturators for speech improvement), mandibular resection, bony transplants and plastic procedures.

The second section, by Walser, describes detailed surgical technics on the eyelids, lacrymal apparatus, eye and orbit. In the third, Herlyn wisely bases his discussion of surgery of the face, nose, tongue, salivary glands and the external ear on a sound, beautifully illustrated anatomical foundation. Some 150 line and halftone drawings plus before-and-after photographs (many dealing with the nose) accompany this part of the text.

Two shorter chapters round out the volume. The one, by Zenker, describes injection of and sectioning of branches of the trigeminal nerve, as well as injection and electrocoagulation of the semilunar ganglion. The other, by Rosenthal, on facial paralysis describes the methods of anastomosis of the facial nerve with the accessory and hypoglossal nerves and muscle transplantation. Each chapter is supported by a generous sampling of references to the literature (principally German).

Most of the halftone reproductions are as fine as could be desired. Some are borrowed, but many are original; all are beautiful.

Even those without formal training in German will find this book helpful by reason of the eloquence of the illustrations. Those who read German moderately well should have no trouble with the clear, readable style of the authors.

The publisher, through his care with the illustrations, selection of paper and excellent binding has matched the high quality of the authors' contributions.

Vernon E. Krahl

ESSENTIALS OF NUTRITION

By Henry C. Sherman, Ph.D., Sc.D., and Caroline Sherman Lanford, Ph.D. Fourth edition, 505 pages. Index. $4.90. New York, Macmillan Co. 1957.

The general character and scope of this work are much the same as in previous editions. Each chapter, however, has been carefully revised to improve the clarity and conciseness of the text and to bring it up-to-date. The scope of the additions dramatically emphasizes the rapid progress of nutritional knowledge within the period of six years since the publication of the previous edition. The additions include new nutritional knowledge concerning fats, protein, body weight, trace minerals, vitamins and geriatric needs. Prominent recognition is given to the firmly established fact that at least one mineral element (calcium) and three vitamins continue to bring increasing long-term benefits from increasingly liberal intakes over actual needs.

The chapter on "Some Relations of Food to Teeth" is well done, although it would have been better to use a term other than "corrode" in reference to the tooth destruction in early stages of dental caries.

Although the number of illustrations is the same, many less pertinent ones have been

replaced by more effective ones. The reading lists have been revised by inclusion of authoritative review articles and recent original research papers. The glossary has been expanded to 12 pages from eight. Although much new information has been included, careful editing has kept the page increase to 50.

This is an excellent book for study and reference by anyone interested in an up-to-date view of the essentials of nutrition and of the practical problems of nutrition.

Dorothea F. Radusch

OUT OF THE TEST TUBE

By Harry N. Holmes, Ph.D., LL.D. Fifth edition. 313 pages with 104 illustrations. Index. $4.50. New York, Emerson Books, Inc., 1957.

This book is a popularized exposition of the impact of chemistry upon civilization. The material is presented in chronological order, starting with the presumably accidental discovery of iron and proceeding to the development of atomic power. Even though *Out of the Test Tube* is dedicated to "intelligent, yet nontechnical people," a good scientific background is very helpful to the reader. Although the industrial, agricultural and military applications of chemistry are stressed, the book also traces and explains theoretical developments in considerable detail.

The paper and typography are good, the author's style is readable and entertaining, and the drawings are clear and attractive.

Out of the Test Tube can be recommended to dentists and others interested in the historical impact of chemistry for occasional light reading.

Donald A. Wallace

ESSENTIALS OF HISTOLOGY

By Margaret M. Hoskins, Ph.D., and Gerrit Bevelander, Ph.D. Third edition. 254 pages with 146 illustrations and 2 color plates. Index. $4. St. Louis, C. V. Mosby Co., 1956.

This book of 19 chapters presents a concise and clearly written account of the essential morphological characteristics of tissues and organs. The first eight chapters deal with the primary tissues, the last 11 describe the various organs. It is designed for beginning courses in histology and is also recommended for those who need a brief but adequate review of the subject.

The subject matter is well organized and the large number of excellent drawings are well labeled. The illustrations also include well chosen microphotographs of varying magnification. The two color plates consist of representations of normal human blood and bone marrow. One electron micrograph of a single myofibril from skeletal muscle is presented. A number of tables dealing with both the tissues and the organs are included in the text. The style of writing is easy to read and the authors, for the sake of brevity, have omitted, for the most part, controversial material, indicating in the preface that the individual teacher may elect to enlarge on the subject matter according to his choice.

The publishers have printed the text material on smooth and good quality paper. The binding is rigid and stable. The type size and spacing, in line with the clarity of the subject material presented, make for easy reading.

George W. Burke, Jr.

PROFESSIONAL PRACTICE MANAGEMENT

By B.C. Egerter, D.S.C., F.A.A.C. 504 pages with 55 illustrations. Index. $15. New York, Pageant Press, Inc., 1957.

Every dentist who has the welfare of his patients, his family and himself at heart will read and thoroughly study Doctor Egerter's splendid treatise, *Professional Practice Management.*

Although this book is written particularly for practitioners of chiropody, its mature expression of professional attitudes and administrative procedures can be applied to all the healing professions.

The 20 chapters, extremely well written and beautifully illustrated, are designed to provide all members of the healing arts with common sense methods of applying business principles without violating their respective codes of ethics.

The author discusses, in a skillful manner, subjects such as practice development methods, a professional life plan, locations and types of practice atmosphere, proper office stationery, practice policy, the role of the assistant, patient contact and impressions, controlled appointment system, the appointment book, patient control, fulfilling the professional obligations, revaluation of service, children in the practice, office routine, suggestions for practice development, fees and overhead, the filing system and collections and accounting.

Among the valuable features contained in this book are 50 photographs of modern professional offices—exteriors, interiors, consultation rooms and treatment rooms. Ten office

layouts are shown plus more than 20 office forms, patient file cards, appointment cards and office and accounting records.

The author has portrayed in a masterful style ethical, stimulating counsel on successful practice and has provided scores of decisions, wisely made, which point the way to achieving long term goals in professional life.

The author has presented considerable new material, his style is easy to read, and he has substantiated all points. The illustrations along with the printing and binding are excellent.

To every dentist interested in surviving economically and desiring to realize his ultimate goals, I would recommend this book to read and own and reread.

Lloyd H. Dodd

CLINICAL LABORATORY METHODS

By W. E. Bray. Fifth edition. 731 pages with 124 figures and 18 color plates. Index. $9.75. St. Louis, C. V. Mosby Co., 1957.

Modernized by the addition of important new material and the discriminative omission of obsolete material, this edition provides clear, well illustrated instructions in present day clinical laboratory methods. There also are adequate sections for the physician, dentist and student on the clinical indications and interpretations of the tests.

Mainly intended for medical technologists, physicians, medical students and nurses, the book does contain certain sections of special concern to the dentists. These include laboratory problems of blood clotting and bleeding diseases and oral bacteriology.

The information is accurate and in accord with modern methods, with good explanations of underlying principles and of interpretations. The basic screening laboratory procedures, which might have to be performed occasionally by any one of us, are especially clear and emphasized. I consider that this book provides an excellent coverage of an extremely broad and complex field.

John B. Fuller

A DICTIONARY OF AMERICAN-ENGLISH USAGE

Edited by Margaret Nicholson. 671 pages. $5. Fair Lawn, N.J., Oxford University Press, Inc., 1957.

This volume is based on H. W. Fowler's *A Dictionary of Modern English Usage*, first published in 1926, and does not depart greatly from it. Although generally helpful, this book might perhaps have been an even better reflection of American usage if its present editor had hesitated less to disagree with her predecessor.

One example from the dental vocabulary will demonstrate the tendency to persist in an "unreal" evaluation of words. Of *dentifrice*, the present work quotes verbatim from its predecessor, "*dentifrice* is a shop word, occasionally heard also as a *genteelism*. *Tooth powder, tooth paste* are what we say to ourselves." In fact, however, *dentifrice* is a useful collective term designating all the tooth cleaners in a single word—tooth powders, tooth pastes, mouth washes and tooth whiteners. Etymologically, it is a good descriptive term, implying something rubbed on the teeth. It is not a product of modern commercialism, nor a euphemism dictated by a mistaken refinement. It appears in Pliny in the form *dentifricium* and has persisted in English and other languages to this day.

If the book is used with some judgment, it will save the writer and speaker from an occasional barbarism or other impropriety.

George B. Denton

NOTES ON ATOMIC ENERGY FOR MEDICAL SCHOOLS

By The Royal Naval Medical School. 169 pages with 53 figures and 10 plates. Index. $4.75. New York, Philosophical Library, Inc., 1956.

This short, simply written introductory text on atomic energy should be understandable to dentists and physicians who have forgotten the basic principles of or who have not had a course in physics. More than one third of the book is devoted to simplified explanations of electricity, roentgen rays, atomic structure, natural and artificial radioactivity and ionization. This forms a background for the remainder of the text which deals with fission, the atomic bomb, radiation detection, biological effects of radiation, treatment of radiation casualties and radiation protection.

This is a primer which supplies enough information to stimulate some readers to consult more complete texts on this important subject. By itself it provides enough information for the reader to engage in conversation on the subject.

There are seven appendixes, a glossary, a short bibliography but no references. Line drawings adequately illustrate most of the important points.

Herbert J. Bartelstone

CLINICAL DENTAL ROENTGENOLOGY

By John Oppie McCall, D.D.S., and Samuel Stanley Wald, D.D.S. Fourth edition. 466 pages with 1,445 illustrations. Index. $10. Philadelphia, W. B. Saunders Co., 1957.

The 32 chapters of this book are well adapted not only for use in teaching but also as ready references for the practicing dentist.

Although there has been little revision of the text material contained in the third edition, many new illustrations have been added. In general the quality of the illustrations has been improved in that there has been an attempt to choose roentgenograms of comparable densities. The section on "X-ray Dosage" has been enlarged to include a great deal of valuable current information on protection from roentgenographic hazards. The role of the new higher kilovoltage machines in this area has been aptly stressed.

As in the third edition, the authors again have placed too much emphasis on the value of the roentgenogram alone in making a differential diagnosis of periapical lesions.

The quality of the paper is good and the binding of the book is excellent. An increase in the spacing between lines results in an improvement in readability as compared to the previous edition.

Seymour H. Yale

HEALTH AND MEDICAL CARE IN NEW YORK CITY

Report by the Committee for Special Research Project in the Health Insurance Plan of Greater New York. 275 pages with 146 tables. Index. $7.50. Cambridge, Mass., Harvard University Press, 1957.

This is a statistical study of the health insurance plan of Greater New York City. Launched in 1947, this plan was designed to provide comprehensive prepaid medical care for families of moderate incomes. Since this was one of the pioneer large-scale prepaid medical care programs, the administrators believed that this study should, first of all, determine the need for this type of medical care for selected population groups and second, determine the volume and kind of medical service utilized by persons covered by the plan as compared with medical services sought and received by similar groups not so covered.

The accuracy of this study was made possible by the health insurance plan's thorough system of reporting all essential data on each physician's contact with each enrollee in the plan. The study group considers that the data accumulated in this book are of great potential value to persons concerned with the development of sound medical care programs.

Although the health insurance program does not include dental care services, a comparison was undertaken of dental care received by two groups, that is, a sample of New York City population and one of health insurance plan enrollees. This was simply an inquiry limited in scope since no clinical data were available. The objective was to learn whether there was any significant difference in the amount of dental care received by the two groups. Examination of returns of this phase of the study showed that about 20 per cent more persons in the health insurance program received some dental care than a comparable adult group of the general population.

If allowances are made for lack of clinical data, this phase of the report is significant.

F. C. Cady

ANALYTICAL PATHOLOGY—TREATISES IN THE PERSPECTIVE OF BIOLOGY, CHEMISTRY AND PHYSICS

Edited by Robert C. Mellors, M.D., Ph.D. 477 pages with illustrations. Index. $12. New York, Blakiston Division, McGraw-Hill Publishing Co., Inc., 1957.

Compiled of treatises in the perspective of biology, chemistry and physics applicable to everyday medicine and dentistry, this book is divided into several parts embodying recent work on cancer, arteriosclerosis, glomerulonephritis, hepatic failure, macrocytic anemia, abnormal hemoglobins, pituitary disorders and hypersensitivity.

The treatises which form this volume reveal present day investigations in pathological physiology with special emphasis on collagen diseases, cancer, allergy, cardiovascular and hepatic disorders. Ordinary pathology is limited to the morphology of disease but there is accompanying revelation of body phenomena in terms of the fundamental sciences. Emphasis is placed on fundamental etiologic and pathogenetic mechanisms.

Well written, clearly presented, beautifully illustrated and well documented by scientific literature, this book should serve as a ready reference for students and practitioners of internal and dental medicine.

I. Newton Kugelmass

Current Literature

DENTAL AUTORADIOGRAPHY. I. CHOICE OF RADIOISOTOPE

Julian D. Boyd. J.D.Res. 36:274 April 1957.

In a continuation of earlier studies of posteruptive changes of teeth in relation to resistance to decay, radioisotope uptake and autoroentgenography have been used to supplement other histopathologic technics for studying the structure of extracted teeth. Radiosulfur has produced autoroentgenograms with sharper histologic detail than resulted from the use of radioiodine or radiophosphorus. Each of the three isotopes, however, portrays different characteristics of tooth structure, and thus each provides a different approach to the study of dental substance.

The tooth specimen is split longitudinally in the buccolingual plane. The half to be examined is polished to a plane surface, washed, dried, and photographed unstained and after staining, either with basic fuchsin or with silver nitrate.

The radioisotope gains entry to the specimen through imbibition. The specimen and the isotope solution are placed on a small plastic planchet which is kept in a covered Petri dish to prevent evaporation. The polished surface of the tooth is placed downward on the planchet, with a small bent piece of fine glass rod interposed between it and the planchet to permit contact of the solution with the entire face of the specimen. The isotope solution is added from a capillary tube until the cut surface is submerged. From 1 to 2 ml. of solution is sufficient. When the specimen has remained immersed for from 18 to 24 hours, it is removed from the solution, rinsed in running water, blotted, rubbed gently with facial tissue to loosen any surface deposit, and dried. The strength of the isotope solution is such that the treated specimen yields satisfactory exposure to the film through 24 hours of contact with the latter. For radioiodine, radiophosphorus and radiosulfur, the amount of isotope needed for each milliliter of solution is 5, 2 and 10 microcuries, respectively.

To maintain the radioactive tooth specimen in exact registry with the photographic film for the necessary period of time, a device is used which provides (1) a flanged base on which the strip of 35 mm. film rests, and (2) a felt-faced mounting block to which the tooth specimen is attached and which serves to orient the specimen accurately in contact with the film surface when the device is assembled. The device permits the simultaneous exposure of several specimens.

Sulfur autoroentgenography permits portrayal of the surface of a specimen of hard tissue, even though the block being studied may be of infinite thickness. This should prove a convenience if it makes the cutting of thin sections unnecessary.

THE USE OF ANTIBIOTICS FOR THE PREVENTION OF BACTEREMIA FOLLOWING ORAL SURGERY

Frank Holmes Cooley and Sol Haberman. J.D.Res. 36:294 April 1957.

The incidence of bacteremia after oral surgery in a group of 49 patients given oxytetracycline hydrochloride was compared with that in a control group of 51 untreated patients. All patients were obtained from the Baylor University College of Dentistry, and were between 18 and 60 years old. The two groups were taken at random with respect to the presence of infection and the number of teeth removed.

Immediately after surgery, a sample of 20 cc. of blood was taken and cultured and observed for growth after 24 hours, 48 hours and 7 days of incubation.

Of the blood samples taken from the 51 untreated patients, 27 yielded one or more species of bacteria. A comparison of 20 (39.21 per cent) positive cultures among the control patients to 7 (14.28 per cent) positive cultures in the premedicated patients shows a significant reduction of bacteremia after premedication with oxytetracycline hydrochloride. *Streptococcus viridans* was the organism most frequently encountered.

Each of the premedicated patients was given two 250 mg. capsules of oxytetracycline hydrochloride by mouth with one cup of water about three hours before oral surgery.

As the presence of infection in and around the extracted teeth must be considered as a factor which may influence the investigation, patients were separated into those having obvious infection and those apparently showing no infection. Of the 20 patients with bacteremia in the control series, nine were uninfected as compared with 11 positive cultures from the infected patients. In the pre-

medicated patients all seven of those with bacteremia showed clinical evidence of infection. This would indicate that oxytetracycline hydrochloride as used acted as a good premedication except where grossly infected teeth or surrounding tissues were involved.

The number of teeth extracted in any one surgical procedure had a significant effect on the incidence of bacteremia. The greater the number of teeth extracted, the more likelihood of bacteremia.

No noticeable change in the normal healing process due to the premedication was observed.

THE LOCATION OF THE "THEORETICAL" ROTATION AXIS AND THE MOVEMENTS OF THE CONDYLES DURING DIFFERENT MOVEMENTS OF THE JAW (UNDERSÖKNINGAR BETRÄFFANDE DEN "TEORETISKA" ROTATIONAXELNS OCH KONDYLENS FÖRSKJUTNING VID UNDERKÄKENS OLIKA SLUTNINGSRÖRELSER)

K. Nevakari. Svensk tandläk. Tskr. 49:763 Dec. 1956.

The purpose of this investigation was to determine the location of the "theoretical" rotation axis and the dimensions of the movements of the condyles during three different closing movements of the mandible: (1) from a relaxed position to central occlusion; (2) from a retrograde position to central occlusion, and (3) from a retrograde opening to a retrograde contact.

Twelve students from the Dental Department, Helsinki University, Finland, participated in the experiment. Their dental status was as close as possible to normal. A small lead pellet (1.2 mm. in diameter) was fastened with wax on a lower incisor and a second one on a lower molar. The head was then fastened in a cephalostat and double exposure roentgenograms were taken, with exposures at the beginning and at the end of each movement. The shadows of the pellets show up clearly on the films, thus indicating the movements of the jaw. The proximate movements of the condyles and the rotation axis can be calculated by the triangle method, as reported by the author in 1954 and 1956.

The results show that in closing movement 1, the geometrically constructed axis is dorsocaudal to the condyles. In closing movement 2 the axis is ventrocranial to the condyles. In closing movement 3 the axis appeared to be within or very close to the condyles. The dimensions of the movements of the condyles varied in 1 from 0.2 to 2.5 mm. In 2 the variation ranged from 0 to —2.2 mm., negative values indicating that the direction is opposite to the physiological closing movement. In 3, 5 of the 12 students showed improvements of from 0.3 to 0.6 mm., whereas the remaining seven had a true hinge movement.

The retrograde position of the mandible was in all instances distal to the central occlusion.

The above results indicate that in recording the bite, for prosthetic or other purposes, the proper starting position is neither the retrograde nor the relaxed position. The ideal starting position would rather seem to lie somewhere between these two.

EOSINOPHILIC GRANULOMA OF BONE: REPORT OF CASE

Theodore H. Dedolph; Anand P. Chaudhry, and David F. Mitchell. J. Oral Surg. 15:247 July 1957.

Eosinophilic granuloma is a relatively benign disease, currently thought to be primarily a disturbance of the reticuloendothelial system with a secondary disturbance of lipoid storage.

A case is reported in which a radiolucent area was discovered in the region of the right mandibular angle. A specimen of the lesion was taken for biopsy but with no conclusive diagnosis. The patient allowed a six month interval to elapse before presenting himself to the School of Dentistry for evaluation of a noninflammatory swelling of the region.

Roentgenograms revealed that the radiolucency had enlarged and become multilocular. Again a biopsy specimen was examined with no definite diagnosis. The patient was referred to the University Hospital for a complete physical examination and treatment.

The laboratory findings were within normal limits. At operation the lesion was completely curetted and the biopsy specimen allowed the definite diagnosis of eosinophilic granuloma to be made.

One year later the patient was readmitted to the University Hospital with a painful swelling over the left femur. Roentgenograms revealed an osteolytic lesion with periosteal proliferation. The lesion was saucerized and microscopic examination of the contents again revealed eosinophilic granuloma.

There was no evidence of recurrence elsewhere in the body as of May 1956.

The case reported illustrates the difficulties a pathologist encounters in making a definite diagnosis because of the variability of findings.

Deaths

Griffin, Fletcher W., Atlanta, Ga.; Atlanta-Southern Dental College, 1919; died May 5; aged 66.

Langdon, Frederick C., Los Angeles; died April 14; aged 89.

Parker, Newell O., Boston; Harvard Dental School, 1905; died May 12; aged 75.

Shaffer, John W., Norristown, Pa.; University of Pennsylvania School of Dentistry, 1905; died May 15; aged 76.

Sherman, Claude A., Tracy, Calif.; Chicago College of Dental Surgery, 1901; died April 3; aged 76.

Simpkins, George F., Williamsburg, Va.; died April 29.

Singer, Morton, New York; University of Pennsylvania School of Dentistry, 1927; died May 22; aged 52.

Southworth, Frank W., Edgerton, Wis.; Northwestern University Dental School, 1919; died April 3; aged 66.

Spencer, Craig L., Coffeyville, Kan.; University of Nebraska College of Dentistry, 1940; died April 3; aged 42.

Spencer, Henry C., Newton, Mass.; Harvard Dental School, 1897; died April 11; aged 84.

Spielman, Herman J., Pittsburgh; University of Pittsburgh School of Dentistry, 1928; died March 2; aged 64.

Staples, Byron F., Portsmouth, N. H.; Boston Dental College, 1899; died April 22; aged 79.

Stein, Edwin L., Wilmington, Del.; George Washington University Dental Department, 1916; died April 1; aged 66.

Stish, Harold E., Mandan, N. D.; Northwestern University Dental School, 1931; died April 6; aged 48.

Storie, David Q., Orange City, Iowa; University of Iowa College of Dentistry, 1929; died May 14; aged 52.

Stout, Jon H., Toledo, Ohio; Ohio State University College of Dentistry, 1946; died April 2; aged 33.

Stutenroth, Charles E., Redfield, S. D.; Northwestern University Dental School, 1896; died April 25; aged 86.

Sullivan, Eugene F., Fall River, Mass.; Temple University School of Dentistry, 1918; died April 21.

Sullivan, Joseph C., Woodside, N. Y.; New York University College of Dentistry, 1928; died May 1; aged 53.

Sutton, Adelbert M., Kenmore, N. Y.; University of Buffalo School of Dentistry, 1913; died April 19; aged 68.

Taylor, William D., Mechanic Falls, Maine; Tufts College Dental School, 1912; died March 31; aged 74.

Thurmond, Thomas D., Griffin, Ga.; Atlanta Dental College, 1908; died April 25; aged 80.

Toerne, Alfred E. E., San Antonio, Texas; Loyola University School of Dentistry, Chicago College of Dental Surgery, 1925; died April 14; aged 57.

Trach, James M., Wheeling, W. Va.; Ohio State University College of Dentistry, 1940; died April 20; aged 51.

Turner, William E., Attleboro, Mass.; University of Illinois College of Dentistry, 1918; died April 8; aged 66.

Van Steenberg, George C., Bloomington, Ill.; University of Illinois College of Dentistry, 1944; died May 25; aged 37.

Verheyen, Carl W., Los Angeles; University of Pennsylvania School of Dentistry, 1916; died May 12; aged 63.

Walker, James E., St. Petersburg, Fla.; Southern Dental College, 1908; died April 19; aged 78.

Wasgatt, Oscar E., Jamaica Plain, Mass.; Boston Dental College, 1895; died April; aged 86.

Watros, Roy, Davenport, Iowa; University of Iowa College of Dentistry, 1904; died May 9; aged 77.

Whitmarsh, Herbert D., Binghamton, N. Y.; University of Pennsylvania School of Dentistry, 1890; died May 9; aged 93.

Wolfe, Emmons R., Tucson, Ariz.; Baltimore College of Dental Surgery, University of Maryland, 1917; died May 24; aged 63.

Raymond, Arthur C., Abilene, Texas; University of Minnesota School of Dentistry, 1913; died April 14; aged 65.

Red, Sim F., Union, Miss.; Southern Dental College, 1910; died May 12; aged 79.

Rennie, William J., Chicago; Northwestern University Dental School, 1914; died April 22; aged 66.

Rinehart, Roy J., Kansas City, Mo.; Western Dental College, Kansas City, Mo., 1902; died March 22; aged 76.

Rini, Vincent, Brooklyn; New York College of Dentistry, New York, 1925; died April 1; aged 58.

Ritchey, William J., Des Moines, Iowa; University of Iowa, College of Dentistry, 1925; died Dec. 9, 1956; aged 53.

Rosenthal, Edward E., New York; New York College of Dentistry, New York, 1917; died March 10; aged 64.

Salsbury, Archie A., New York; Temple University School of Dentistry, Philadelphia, 1918; died March 24; aged 61.

Scharff, Ferdinand H., Chicago; Northwestern University Dental School, 1905; died Dec. 23, 1956; aged 76.

Schumacher, John C. Robert, St. Louis; George Washington University Dental Department, St. Louis, 1905; died Dec. 4, 1956; aged 76.

Schurz, Arthur W., Boynton Beach, Fla.; died Feb. 25; aged 81.

Sebolt, William A., Davenport, Iowa; Chicago College of Dental Surgery, 1898; died Feb. 25; aged 86.

Sennett, Patrick A., Poultney, Vt.; Ohio College of Dental Surgery, University of Cincinnati, 1925; died Jan. 29; aged 56.

Seybold, John W., Denver; University of Denver School of Dentistry, 1908; died Feb. 1; aged 74.

Sharon, Harold E., Oneida, N. Y.; Tufts College Dental School, Boston, 1939; died Dec. 6, 1956; aged 42.

Shepherd, Hassell N., Nashville, Tenn.; Vanderbilt University School of Dentistry, Nashville, 1904; died March 4; aged 80.

Sherwood, Ralph E., New Orleans; Tulane University School of Dentistry, New Orleans, 1911; died March 4; aged 66.

Simonek, Leo G., Berwyn, Ill.; Loyola University School of Dentistry, Chicago College of Dental Surgery, 1928; died March 8; aged 51.

Spotts, William B., St. Louis; Washington University School of Dentistry, St. Louis, 1912; died March 5; aged 68.

Staples, Eduarde F., East Stroudsburg, Pa.; University of Pennsylvania School of Dentistry, Philadelphia, 1925; died Feb. 5; aged 64.

Steffey, Hal A., Kansas City, Mo.; Western Dental College, Kansas City, Mo., 1912; died March 13; aged 74.

Stephanis, Constantine, Philadelphia; University of Pennsylvania School of Dentistry, Philadelphia, 1918; died Nov. 22, 1956; aged 68.

Stevenson, Charles E., Homestead A.F.B., Fla.; Washington University School of Dentistry, St. Louis, 1951; died Dec. 4, 1956; aged 38.

Stratton, Alfred C., Groton, S. D.; Kansas City Dental College, Kansas City, Mo., 1900; died Dec. 29, 1956; aged 88.

Styne, Ray H., Buena Vista, Va.; Medical College of Virginia School of Dentistry, Richmond, 1923; died Jan 28; aged 56.

Tate, Fred N., Albany, N. Y.; Pennsylvania College of Dental Surgery, Philadelphia, 1892; died March 4; aged 85.

Thebaut, Charles E., Ringgold, Ga.; Atlanta Dental College, 1908; died March 4; aged 71.

Thomas, A. Seymour, Jr., New London, N. H.; Columbia University School of Dental and Oral Surgery, New York, 1941; died March 24; aged 42.

Thompson, Charles M., Chicago; Northwestern University Dental School, 1924; died March 30; aged 58.

Tidball, Morris V., Buenos Aires, R. Argentina; North Pacific Dental College of Oregon School of Dentistry, Portland, 1914; died Feb. 19; aged 67.

Trullinger, Paul A., Waldport, Ore.; University of California College of Dentistry, San Francisco, 1904; died March 13; aged 76.

Twelves, Ralph F., Salt Lake City; Northwestern University Dental School, 1924; died Oct. 27, 1956; aged 60.

Vance, William A., Nashville, Mich.; University of Michigan School of Dentistry, Ann Arbor, 1903; died March 5; aged 81.

Vandercook, Fred F., Howell, Mich.; University of Michigan School of Dentistry, Ann Arbor, 1900; died March 4; aged 80.

Van Hise, Roland S., Covington, Ohio; Cincinnati College of Dental Surgery, Cincinnati, 1897; died March 18; aged 82.

Wahn, Abe Leonard, St. Petersburg, Fla.; Cincinnati College of Dental Surgery, Cincinnati, 1912; died Nov. 21, 1956; aged 66.

Walrath, George D., Clinton, Iowa; University of Iowa, College of Dentistry, 1926; died March 20; aged 58.

Washington, Henry R., Port Huron, Mich.; Meharry Medical College School of Dentistry, Nashville, 1923; died March 7; aged 53.

Watson, William J., Hot Springs, Ark.; Vanderbilt University School of Dentistry, Nashville, 1920; died Feb. 26; aged 59.

Weiner, Max, Rego Park, L. I., N. Y.; Tufts University, School of Dental Medicine, 1919; died Feb. 7; aged 60.

Welch, Francis J., Boston; Tufts University, School of Dental Medicine, 1918; died Feb. 23; aged 63.

Whitaker, Little, Cumberland, Ky.; Louisville College of Dentistry, 1912; died Dec. 29, 1956; aged 73.

Wiatt, Herbert S., Troy, Va.; Ohio College of Dental Surgery, University of Cincinnati, 1923; died March 12; aged 58.

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THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION
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LON W. MORREY, *Editor* JOHN J. HOLLISTER, *Business Manager*

All expressions of opinion and all statements of supposed fact are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Dental Association, unless such statements or opinions have been adopted by the Association. Articles are accepted with the understanding that they have not been published previously and that they are submitted solely to The Journal. The Journal of the American Dental Association is indexed in the Index to Dental Literature, in the Current List of Medical Literature and, in part, in the Quarterly Cumulative Index Medicus, Biological Abstracts and Chemical Abstracts.

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Eighth Annual Session	Nov. 4-7, 1957	Miami, Fla.
Ninety-Ninth Annual Session	Nov. 10-13, 1958	Dallas, Texas
One-Hundredth Annual Session	Sept. 21-24, 1959	New York
One-Hundred and First Annual Session	Oct. 17-20, 1960	Los Angeles
One-Hundred and Second Annual Session	Oct. 16-19, 1961	Philadelphia

MEETINGS OF CONSTITUENT SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 24-26, 1958	Montgomery	C. R. Crook	Professional Center Montgomery
Alaska	June 3-6, 1958	Palmer	C. L. Polley	Box 1896, Juneau
Arizona	Apr. 16-19, 1958	Tucson	W. G. Burke	17 E. Weldon Ave., Phoenix
Arkansas	Apr. 13-16, 1958	Little Rock	D. M. Hamm	Box 89, Clarksville
California	Apr. 20-23, 1958	San Francisco	W. J. Healy	450 Sutter St., San Francisco
S. California	Apr. 14-16, 1958	Los Angeles	S. M. Silverman	903 Crenshaw Blvd., Los Angeles 19
Colorado	Oct. 6-9	Colorado Springs	G. H. Jackson	724 Republic Bldg., Denver
Connecticut	May 14, 15, 1958	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			A. G. Schiek	3716 Philadelphia Pike, Claymont
District of Columbia	Mar. 9-12, 1958	Washington	J. F. Keaveny	1029 Vermont Ave., N.W., Washington
Florida	May 18-21, 1958	Miami Beach	G. J. Perdigon	17 Davis Blvd., Tampa
Georgia			J. W. Yarbrough	Southern United Bldg., Macon
Hawaii	June 15-19, 1958	Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu
Idaho	May 1958	Boise	G. L. Williamson	1003½ Main St., Boise
Illinois	May 11-14, 1958	Springfield	P. W. Clopper	632 Jefferson Bldg., Peoria
Indiana	May 19-21, 1958	Indianapolis	W. R. Shoemaker	Citizens Bank Bldg., Anderson
Iowa	May 5-7, 1958	Des Moines	H. I. Wilson	Insurance Exchange Bldg., Des Moines
Kansas	May 5-8, 1958	Kansas City, Mo.	F. A. Richmond	Brotherhood Bldg., Kansas City 1
Kentucky	Mar. 23-26, 1958	Louisville	A. B. Coxwell, Jr.	2208 Dundee Rd., Louisville 5
Louisiana	Apr. 9-12, 1958	Monroe	J. S. Bernhard	2515 Line Ave., Shreveport
Maine			S. M. Gower	Box 27, Skowhegan
Maryland	May 4-7, 1958	Baltimore	C. L. Inman, Jr.	Medical Arts Bldg., Baltimore
Massachusetts	May 4-7, 1958	Boston	H. E. Tingley	12 Bay State Rd., Boston 15
Michigan	Apr. 28-30, 1958	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Apr. 14-16, 1958	St. Paul	C. V. E. Cassel	2236 Marshall Ave., St. Paul 4
Mississippi	June 9-11, 1958	Biloxi	B. A. Cohen	500-E E. Woodrow Wilson Dr., Jackson 27
Missouri	May 4-7, 1958	Kansas City	E. D. Suggett	Merchants Bank Bldg., Jefferson City
Montana	May 1-3, 1958	Butte	R. C. Ritter	28 N. Black St., Bozeman
Nebraska	Apr. 28-30, 1958	Omaha	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada	June 1958	Reno	O. M. Seifert	755 Ryland Ave., Reno
New Hampshire	June 22-24, 1958	Whitefield	F. E. Williams	814 Elm St., Manchester
New Jersey	May 18-21, 1958	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 25-28, 1958	Las Cruces	J. S. Eilar	7 Medical Arts Sq., N.E., Albuquerque
New York	May 12-14, 1958	Buffalo	C. A. Wilkie	1 Hanson Pl., Brooklyn 17
North Carolina	May 4-7, 1958	Pinehurst	L. H. Butler	Jefferson Bldg., Greensboro

State	Date	Place	Secretary	Address
North Dakota	May 4-7, 1958	Bismarck	J. H. Pfister	419½ Dakota Ave., Wahpeton
Ohio	Oct. 6-9	Columbus	E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 20-23, 1958	Oklahoma City	L. D. Wright	Osler Bldg., Oklahoma City
Oregon	Mar. 3-5, 1958	Portland	T. D. Holder	Selling Bldg., Portland
Panama Canal Zone	Apr. 1958	Ancon	W. R. Bond, Jr.	U.S.A., Ft. Kobbe Dental Clinic, Ft. Kobbe
Pennsylvania	May 21-23, 1958	Harrisburg	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	January 1958		R. Borges	Box 843, Arecibo
Rhode Island	Jan. 28, 29, 1958	Providence	W. F. Decesare	216 Broadway, Providence
South Carolina	May 11-13, 1958	Myrtle Beach	J. E. Wallace	1420 Gregg St., Columbia
South Dakota	May 11-13, 1958	Mitchell	R. E. Decker	Box 308, Parker
Tennessee	May 12-15, 1958	Chattanooga	K. P. Ezell	116 N. Academy, Murfreesboro
Texas	May 3-6, 1959	San Antonio		3707 Gaston Ave., Dallas 10
Utah	May 22-24, 1958	Salt Lake City	R. C. Dalgleish	State Capitol Bldg., Salt Lake City
Vermont	May 25-27, 1958	Manchester	E. H. Van Santvoord	22 Washington St., Rutland
Virginia	May 4-7, 1958	Richmond	W. T. McAfee	Colonial National Bank Bldg., Roanoke
Washington	Mar. 24-26, 1958	Seattle	W. P. Brust	Medical Center, Everett
West Virginia	July 20-23, 1958	White Sulphur Springs	G. N. Casto, Jr.	710½ Lee St., Charleston
Wisconsin	Apr. 21-23, 1958	Milwaukee	H. O. Hoppe	1331 W. Vliet St., Milwaukee
Wyoming	June 12-14, 1958	Casper	T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama			W. L. McCarty	Professional Center, Montgomery
Alaska			R. H. Williams	Box 2122, Juneau
Arizona			W. G. Biddulph	1502 W. Osborn Rd., Phoenix
Arkansas	June 16-20, 1958	Little Rock	W. T. Jones	107 E. Shelton, Monticello
California			D. R. Grant	507 Polk St., San Francisco
Colorado			R. F. Gilmore	Republic Bldg., Denver 2
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia	Jan. 6-10, 1958	Washington	W. T. Birthright	1835 Eye St., N.W., Washington
Florida			R. P. Taylor, Jr.	P. O. Box 2913, Jacksonville 3
Georgia	June 9-11, 1958	Atlanta	W. G. Brown	Blackshear
Hawaii			J. Y. Ing	James Campbell Bldg., Honolulu
Idaho			A. G. DeWinter	Sun Bldg., Boise
Illinois			W. A. McKee	Wood Bldg., Benton
Indiana	Dec. 2-5*†	Indianapolis	C. A. Frech	Gary National Bank Bldg., Gary
Iowa	June 2-6, 1958*†	Iowa City	P. A. Hahn	Farmers & Merchants Bank Bldg., Burlington
Kansas			G. L. Teall	Box 71, Hiawatha
Kentucky			J. J. Kelly	102 W. Madison St., Franklin
Louisiana			R. C. Steib	Maison Blanche Bldg., New Orleans
Maine			A. S. Appleby	Box 260, Skowhegan
Maryland	Nov. 18-20‡		W. D. Burton	829 Park Ave., Baltimore 1
Massachusetts			A. M. Bommer	349 Broadway, Revere
Michigan	Jan. 19-25 June 8-14, 1958	Ann Arbor	J. L. Champagne	3714 W. McNichols Rd., Detroit 21
Minnesota			M. G. Walls	Lowry Bldg., St. Paul
Mississippi	Jan. 6-8, 1958*†‡		A. H. Richter, Jr.	Aven Bldg., Greenwood
Missouri			R. R. Rhoades	Central Trust Bldg., Jefferson City

State	Date	Place	Secretary	Address
Montana			R. O. Betzner	303 Power Block, Helena
Nebraska			H. E. Weber	Stuart Bldg., Lincoln
Nevada			A. A. Cozzalio	130 N. Virginia, Reno
New Hampshire	June 19, 20* June 19,† 1958	Boston	S. G. Markos	8 Renaud Ave., Dover
New Jersey			C. J. Schweikhardt	150 E. State St., Trenton 8
New Mexico			J. J. Clarke, Sr.	Artesia
New York	Dec. 10-13*‡		D. W. Beier	23 S. Pearl St., Albany 7
North Carolina			J. H. Guion	Doctors Bldg., Charlotte 7
North Dakota	July 7-11, 1958	Fargo	G. F. Wirtz	Clinic Bldg., Mandan
Ohio	Oct. 10-15*†	Columbus	D. E. Bowers	322 E. State St., Columbus 15
Oklahoma			W. E. Cole	2420 N. Meridian, Oklahoma City
Oregon	Dec. 16-18*†	Portland	F. L. Utter	Pioneer Trust Bldg., Salem
Pennsylvania	Dec. 2-6*‡ Dec. 2-4†‡		R. E. V. Miller, Sr.	Dept. of Public Instruction, Box 911, Harrisburg
Puerto Rico			J. Mercado C.	Comercio St. #452, San Juan
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina			W. J. Brockington	1508 Washington St., Columbia 1
South Dakota			H. T. Aker	Canton
Tennessee	Dec. 16-20‡		C. R. Aita	Bennie-Dillon Bldg., Nashville
Texas			R. T. Weber	Capital National Bank Bldg., Austin 16
Utah			A. Ridge, Jr.	10 S. Second E., Provo
Vermont	June 23-25, 1958*†	Burlington	P. M. Fitch	Newport
Virginia			J. M. Hughes	Medical Arts Bldg., Richmond
Washington			F. S. Rotchford	1108 S. Washington St., Olympia
West Virginia	June 23-25, 1958	West Liberty	C. C. Cottrill	Box 111, Glen Rogers
Wisconsin			S. F. Donovan	Tomah
Wyoming			W. A. Hocker	O & S Bldg., Casper

Most states require applications to be in 30 days prior to examination date.
*Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
Academy of Dentistry for the Handicapped	Feb. 2 1958	Chicago	M. L. Bramer Secy.	3405 W. North Ave., Chicago
American Academy of Crown and Bridge Prosthodontics	Feb. 1-2, 1958	Chicago	C. E. Brooks Secy.	4500 Olive St., St. Louis 8
American Academy of Dental Medicine	Dec. 8	New York	G. J. Witkin Secy.	45 S. Broadway, Yonkers, N.Y.
American Academy of Gold Foil Operators	Nov. 1, 2	New Orleans	R. B. Wolcott Secy.	Navy Dental Tech. School, Naval Training Center, San Diego, Calif.
American Academy of Implant Dentures	Nov. 2-4	Miami, Fla.	P. S. Loechler Secy.	540 N. California, Stockton, Calif.
American Academy of Maxillofacial Prosthetics	Jan. 30, 31, 1958	Chicago	H. C. Sullivan Secy.	1516 Wealthy St., S.E., Grand Rapids 6, Mich.
American Academy of Oral Pathology	Mar. 30, 31, 1958	Washington, D.C.	J. L. Bernier Secy.	Armed Forces Institute of Pathology, Washington 25, D.C.
American Academy of Oral Roentgenology	Nov. 1, 2	Miami Beach, Fla.	H. M. Berry, Jr. Secy.	4001 Spruce St., Philadelphia 4
American Academy of Periodontology	Oct. 31-Nov. 2	Miami, Fla.	C. E. Chamberlain Secy.	1101 N. North St., Peoria, Ill.
American Academy of Restorative Dentistry	Feb. 1, 2, 1958	Chicago	A. G. James Secy.	409 N. Camden Dr., Beverly Hills, Calif.
American Association of Dental Examiners	Nov. 1, 2		C. A. Bumstead Secy.	Stuart Bldg., Lincoln, Neb.
American Association of Dental Schools	Mar. 23-26, 1958	Detroit	M. W. McCrea Secy.	University of Minnesota, School of Dentistry, Minneapolis 14

Name	Date	Place	Secy. or Chm.	Address
American Association of Endodontists	Jan. 31-Feb. 2, 1958	Chicago	V. B. Milas Secy.	2559 W. 63rd St., Chicago 29
American Board of Oral Pathology	Dec. 7, 8		D. A. Kerr Secy.	University of Michigan, School of Dentistry, Ann Arbor, Mich.
American Board of Oral Surgery	Dec. 2 Apr. 5-8, 1958	Chicago	L. M. FitzGerald Secy.	Roshek Bldg., Dubuque, Iowa
American College of Dentists	Nov. 3	Miami Beach, Fla.	O. W. Brandhorst Secy.	4221 Lindell Blvd., St. Louis 8
American Dental Assistants Association	Nov. 4-7	Miami Beach, Fla.	M. L. Martin Exec. Secy.	First National Bank Bldg., LaPorte, Ind.
American Dental Hygienists' Association	Nov. 4-7	Miami Beach, Fla.	M. E. Swanson Exec. Secy.	1735 Eye St., N.W., Washington 6, D.C.
American Dental Society of Anesthesiology	Nov. 2, 3	Miami, Fla.	A. J. Follenius Secy.	73 New York Pl., Staten Island 14, N.Y.
American Denture Society	Nov. 1-3	Miami, Beach Fla.	V. L. Steffel Secy.	College of Dentistry Ohio State University, Columbus, Ohio
American Equilibration Society	Jan. 30, 1958	Chicago	W. W. Hurst Secy.	820 S. Damen Ave., Chicago 12
American Institute of Dental Medicine	Oct. 13-17	Palm Springs, Calif.	M. G. Lewis Exec. Secy.	2240 Channing Way, Berkeley 4, Calif.
American Public Health Association	Nov. 11-15	Cleveland	R. M. Atwater Exec. Secy.	1790 Broadway, New York 19
American Society for the Advancement of General Anesthesia in Dentistry	Oct. 28	New York	M. H. Feldman Exec. Secy.	730 Fifth Ave., New York 19
American Society of Dentistry for Children	Nov. 1-3	Miami, Fla.	W. E. Brown Secy.	705 N. University Ave., Ann Arbor, Mich.
American Society of Oral Surgeons	Oct. 30-Nov. 2	Miami Beach, Fla.	A. B. Coxwell Exec. Secy.	2208 Dundee Rd., Louisville 5, Ky.
Asociacion Odontologica Argentina, Thirteenth Jornadas	Oct. 14-17	Buenos Aires	J. M. Lueje Secy.	959 Junin, Buenos Aires, Argentina
Association of American Women Dentists	Nov. 4	Miami Beach, Fla.	D. Rizzo Secy.	3643 W. Chicago Ave., Chicago
Chicago Dental Society	Feb. 2-5, 1958	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Cincinnati Dental Society	Mar. 23-25, 1958	Cincinnati	H. F. Lee Chm.	3180 Harrison Ave., Cincinnati 11
Council on Dental Education, Dental Aptitude Tests	Oct. 4, 5		S. Peterson Secy.	222 E. Superior St., Chicago
Dallas Mid-Winter Dental Clinic	Jan. 26-29, 1958	Dallas	W. W. Sherrill Exec. Secy.	2609 Cedar Springs, Dallas, Texas
Denver Dental Association	Jan. 5-8, 1958	Denver	E. T. Klein Secy.	Republic Bldg., Denver 2
Greater New York Dental Meeting	Dec. 9-13	New York	I. Teich Secy.	Hotel Statler, New York 1
Greater Philadelphia Annual Meeting	Mar. 25-28, 1958	Philadelphia	M. Kohn Exec. Secy.	Sheraton Hotel, 17th St. and Pennsylvania Blvd., Philadelphia 3
International Academy of Anesthesiology	Oct. 24	Allentown, Pa.	I. G. Tomack Secy.	355 E. 149th St., New York 55
International Association for Dental Research	Mar. 20-23, 1958	Detroit	D. Y. Burrill Secy.	129 E. Broadway, Louisville 2, Ky.
Mexican Dental Association, Fourth Congress	Nov. 10-14	Mexico City	E. Martinez R. Secy.	Sinaloa 9, Mexico, D.F.
Mid-Continent Dental Congress	Nov. 17-20	St. Louis	J. E. Brophy Exec. Secy.	8013 Maryland Ave., St. Louis 5
National Association of Dental Auxiliaries	Nov. 6	Miami Beach, Fla.	M. G. Kulstad Chm.	1914 Roosevelt St., Bakersfield, Calif.
National Association of Seventh-day Adventist Dentists	Nov. 1-3	Miami Beach, Fla.	G. H. Curtis Secy.	P.O. Box 101, Loma Linda, Calif.
National Board of Dental Examiners	Dec. 2, 3		G. J. Casey Secy.	222 E. Superior St., Chicago
New England Dental Society	Oct. 16, 17	Boston	F. L. Finley, Jr. Secy.	43 Farmington Ave., Hartford, Conn.
New Orleans Dental Conference	Nov. 10-14	New Orleans	E. Burvant Secy.	Maison Blanche Bldg., New Orleans
Ninth District Dental Society of Montana	Jan. 16-18, 1958	Billings	C. H. Betzer Secy.	1231 N. 29th St., Billings, Mont.

Name	Date	Place	Secy. or Chm.	Address
Northeastern Society of Orthodontists	Oct. 21, 22	Buffalo	D. Mossberg Secy.	36 Central Park S., New York
Norwegian Dental Association, Annual Meeting	Oct.	Oslo, Norway	K. Gard Secy.	Incognitogatan 17, Oslo, Norway
Pan American Odontological Association	Dec. 11	New York	R. H. Brodsky Exec. Secy.	14 E. 81 St., New York
Second Asian Dental Congress and Asian-Pacific Dental Conference	Mar. 24-30, 1958	Manila, Philippines	B. B. Erana Pres. Elect	P. O. Box 373, Manila, Philippines
Thirty-First Journees Dentaires Internationales de Paris	Nov. 25-Dec. 1	Paris, France	R. Ibos	14 Ave. Gabriel-Peri, Antony, Seine, France
Thomas P. Hinman Dental Clinic	Mar. 16-19, 1958	Atlanta, Ga.	H. Wallace Secy.	1415 The By Way N.E., Atlanta, Ga.
Uruguayan Dental Society, Fourth International Meeting	Nov. 20-22		H. Sacchi	Vazquez 1414, P.5, Montevideo, Uruguay

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CLASSIFIED ADVERTISING

Forms close on 20th of second month preceding month of issue

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222 E. Superior Street
Chicago 11, Ill. Box.....
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LOUISIANA — Beautiful and completely equipped one chair modern and active dental office in Maison Blanche Building in New Orleans. To be sold to highest bidder. Address A.D.A. Box No. 746.

MAINE — Dental office, modern, fully equipped, two operating rooms, laboratory, reception room on ground floor in business building. Always busy practice. Low rental. Priced very reasonably because of illness. Dr. James H. Cunningham, 35 Cottage St., Bar Harbor, Me.

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MICHIGAN—For sale. Practice and equipment. Excellent location in Muskegon. Spacious air conditioned, two-chair office with Ritter equipment. Opportunity for good start. Leaving for family health. Address A.D.A. Box No. 733.

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NEW JERSEY — Monmouth County. For sale. Two-chair, air conditioned office. Rent $70 per month. Established 15 years. Active. Moving out of state. $4,800 for immediate sale. Address A.D.A. Box No. 588.

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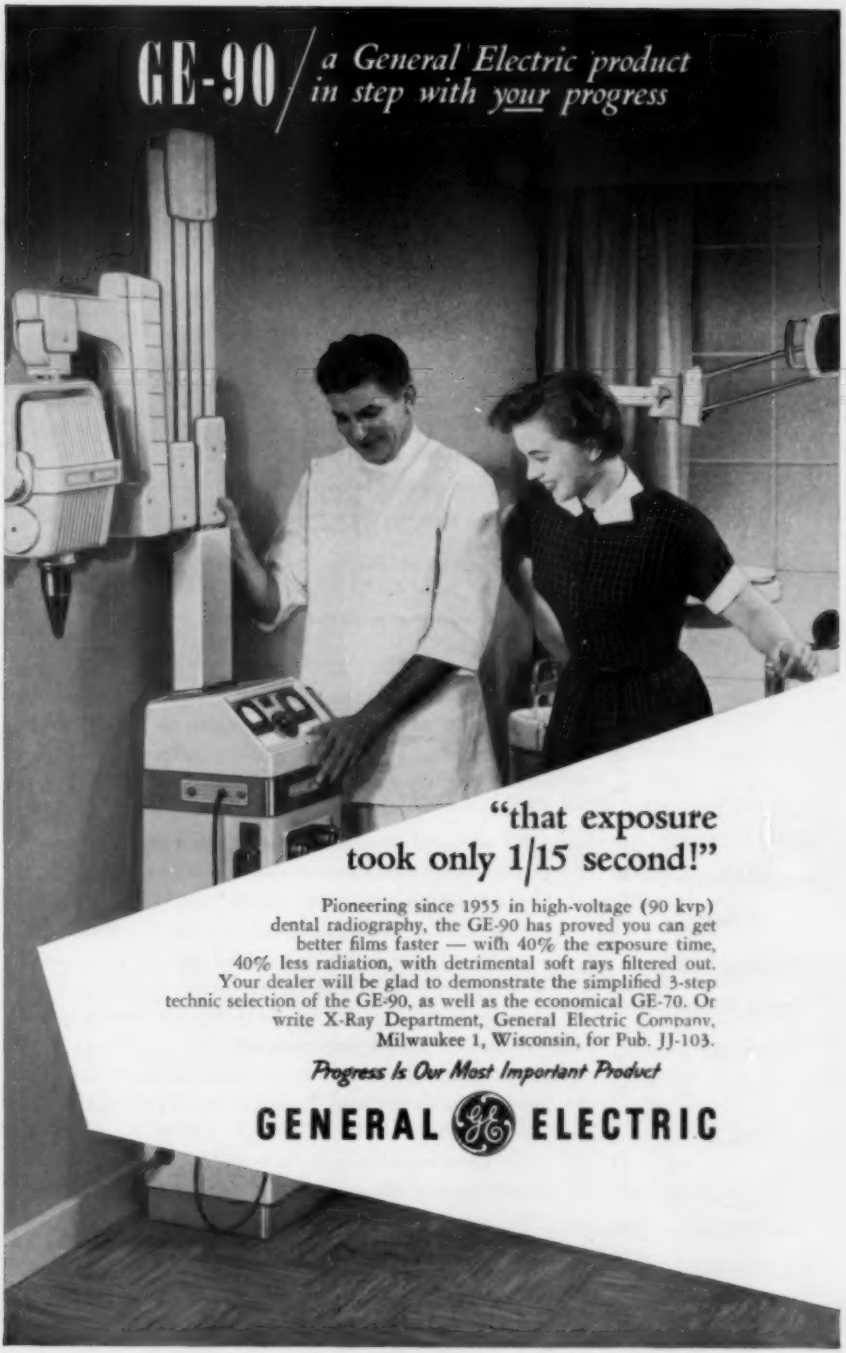
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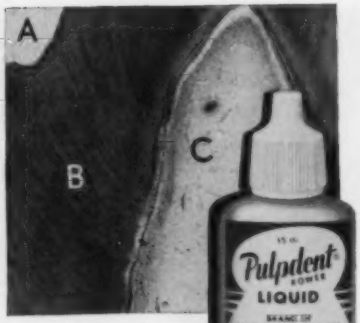

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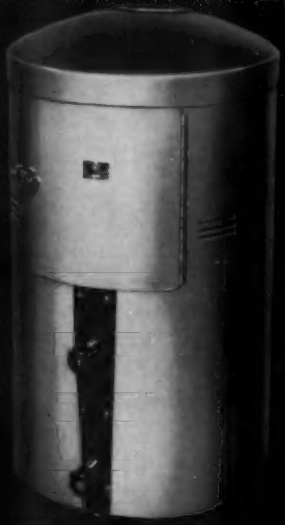

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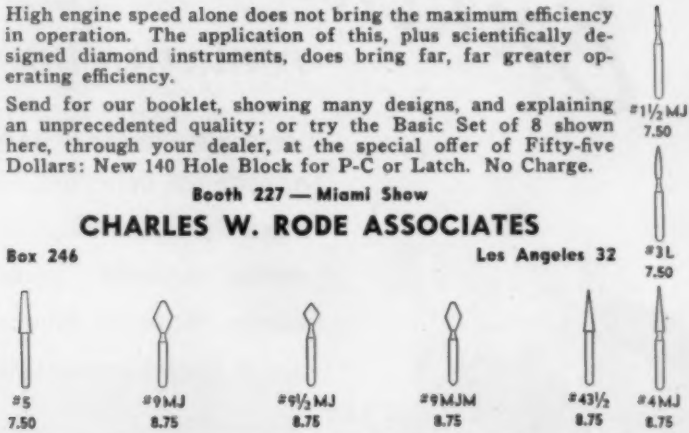

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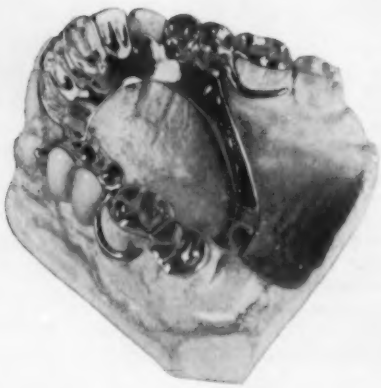

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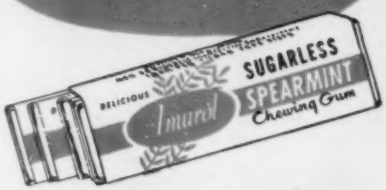

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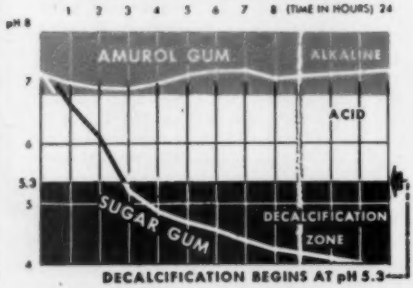

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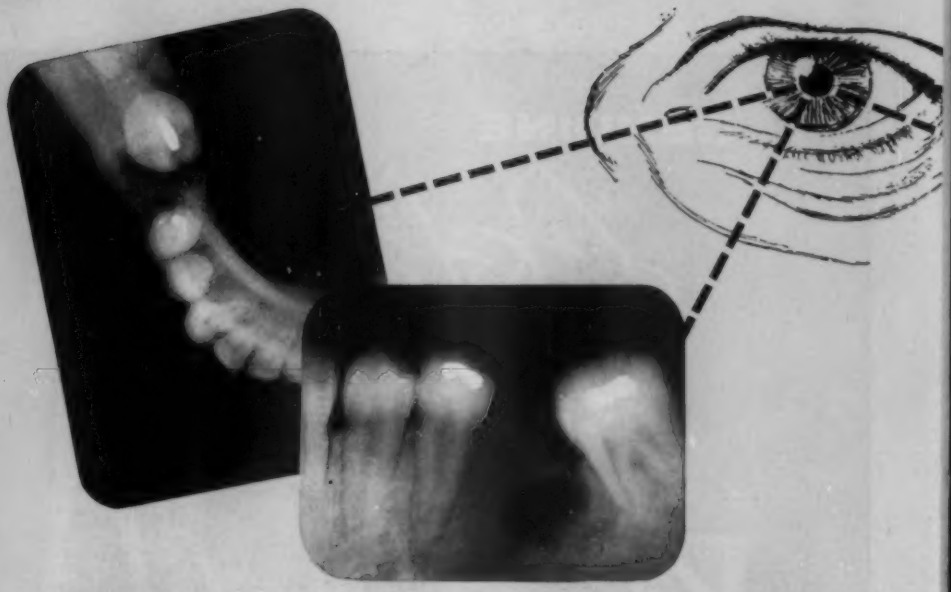

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*Nelson, Robert J., Pelander, Carl E., Krumpuca, John W. "Hydraulic Turbine Contra-Angle Handpiece." JADA 47 324-329 Sept. 1953 (Available upon request).

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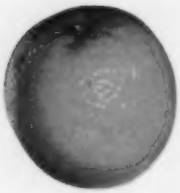

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1. King, C. G.: J. Am. Diet. A. 30:13, 1954.
2. Kelsten, L. B.: J. Dent. Med. 10:67, 1955.
3. Amer. Dent. Assoc.: Diet and Dental Health, Chicago, 1955, pp. 7-8.

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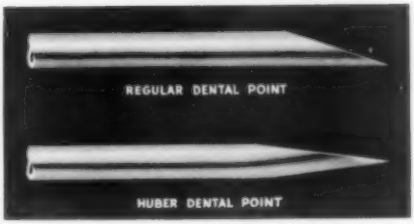

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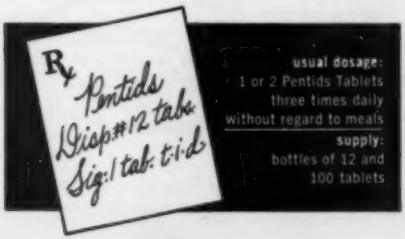

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DENTAL X-RAY NEWS

No. 11

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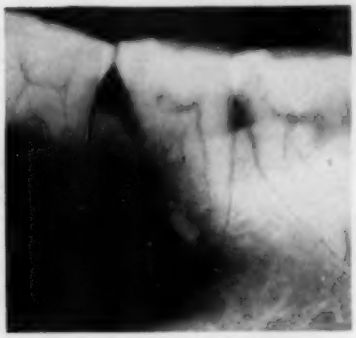
HOW TO AVOID POOR RADIOGRAPHS CAUSED BY IMPROPER HANDLING



Stray white light in your darkroom can ruin your films during processing. That's what happened to the radiograph shown above. When it was being removed from the packet, the darkroom door was not quite shut, permitting white light to enter. This light fogged the film badly and made it useless as a diagnostic radiograph.

Make sure your darkroom is light-tight. White light will penetrate the smallest crack in a door, a cracked or faded safelight, even a pinhole in black curtains over a window. If the light can be seen at all, your film can be affected.

For complete processing information, write to us for your free copy of "Darkroom Guide." Du Pont Photo Products Department, 2420-2 Nemours Building, Wilmington 98, Delaware. In Canada, Du Pont Company of Canada (1956), Limited, Toronto.

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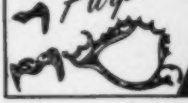

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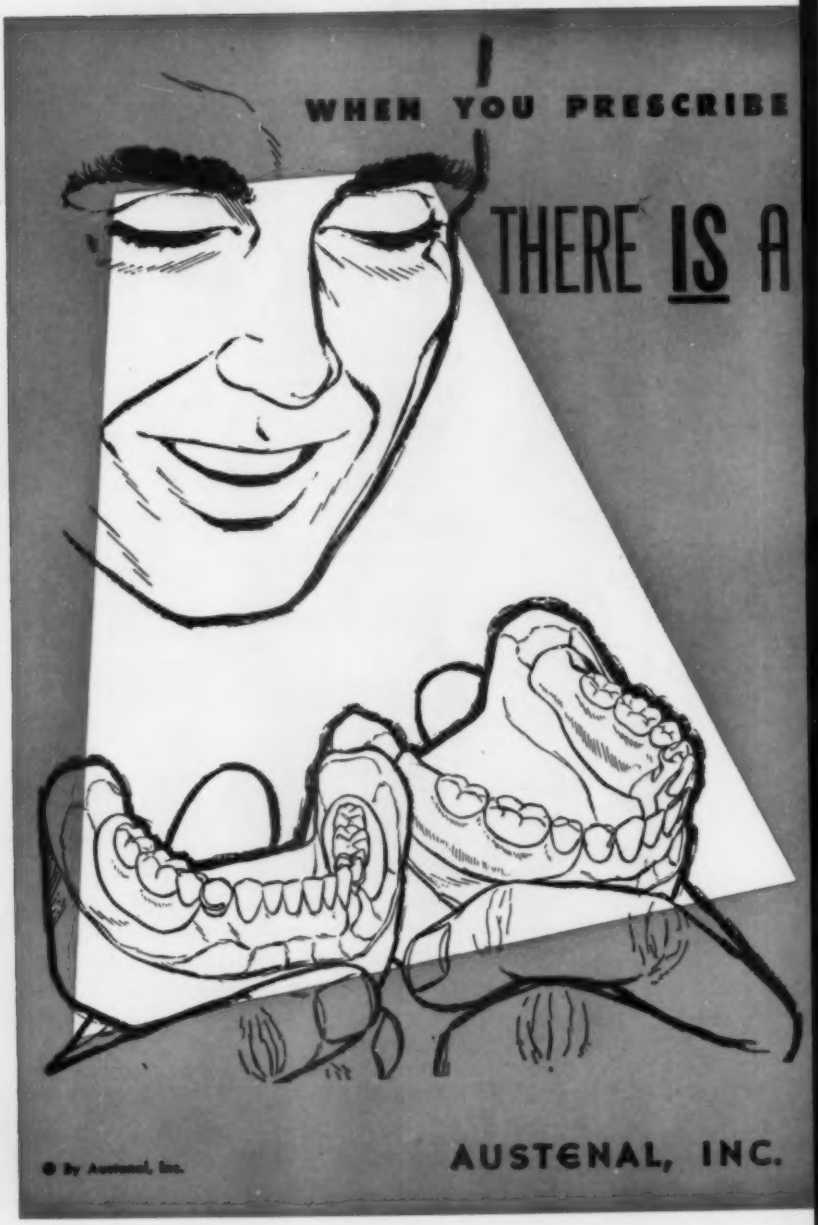
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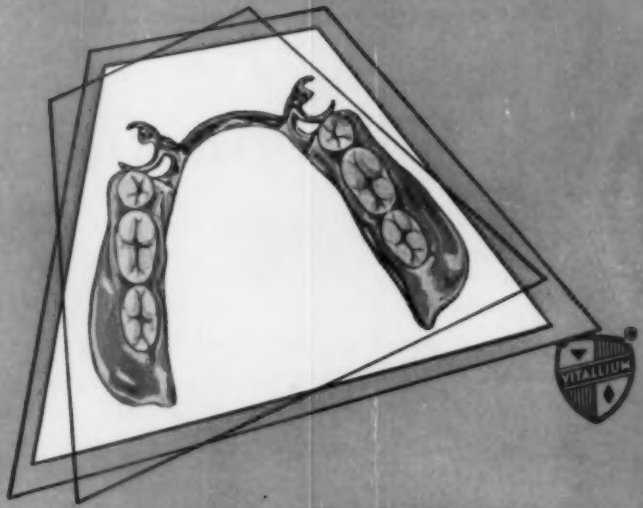

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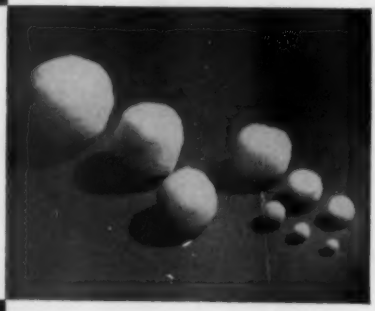

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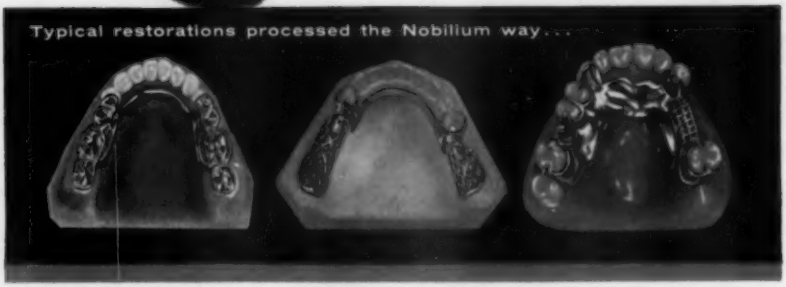

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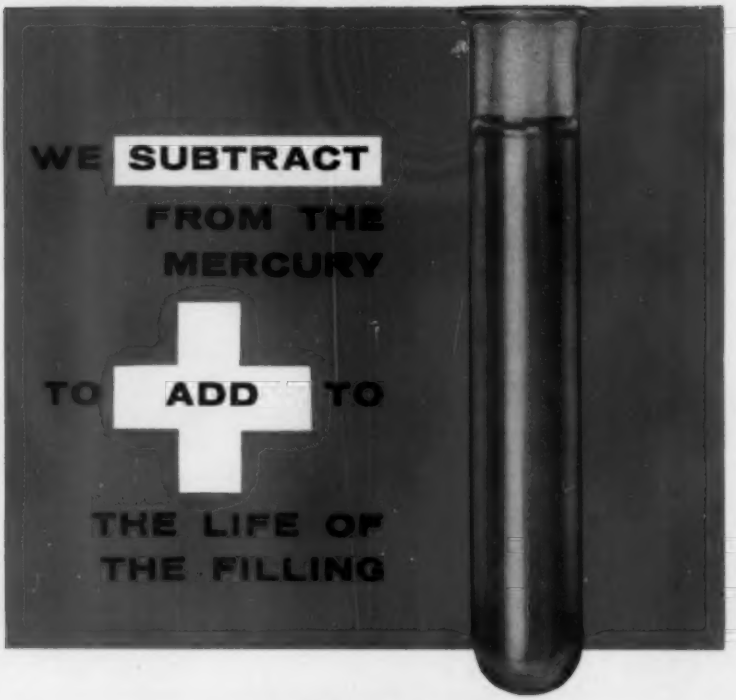

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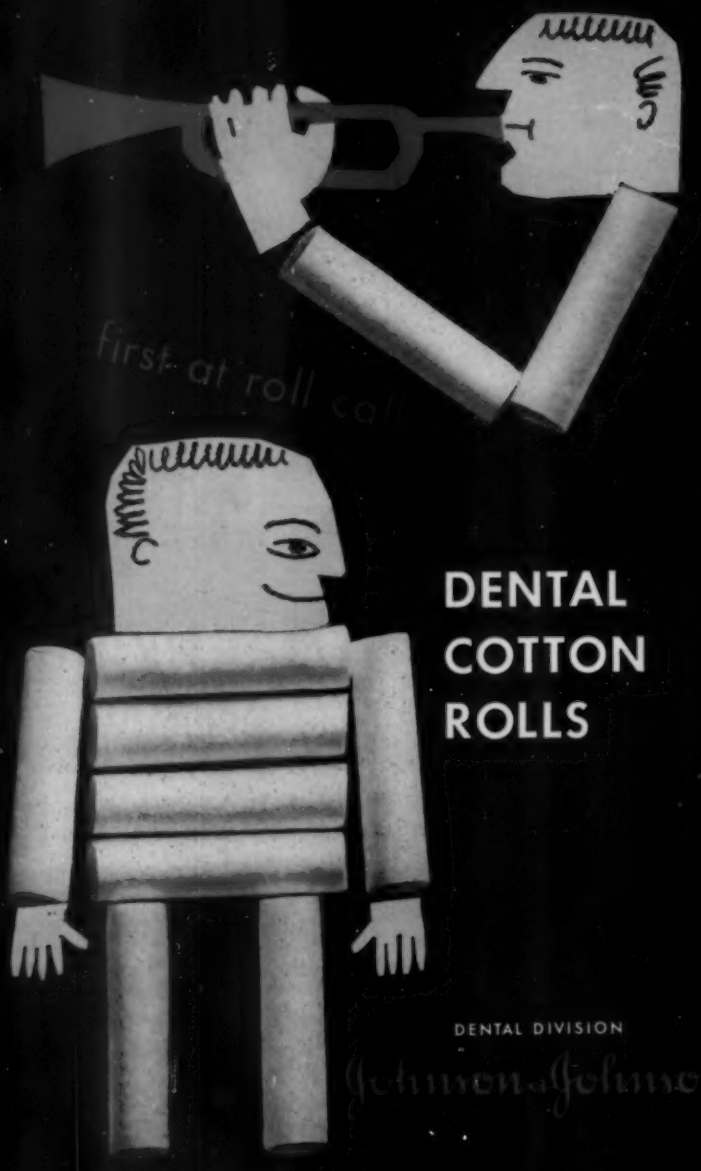

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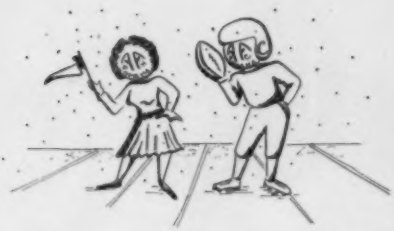

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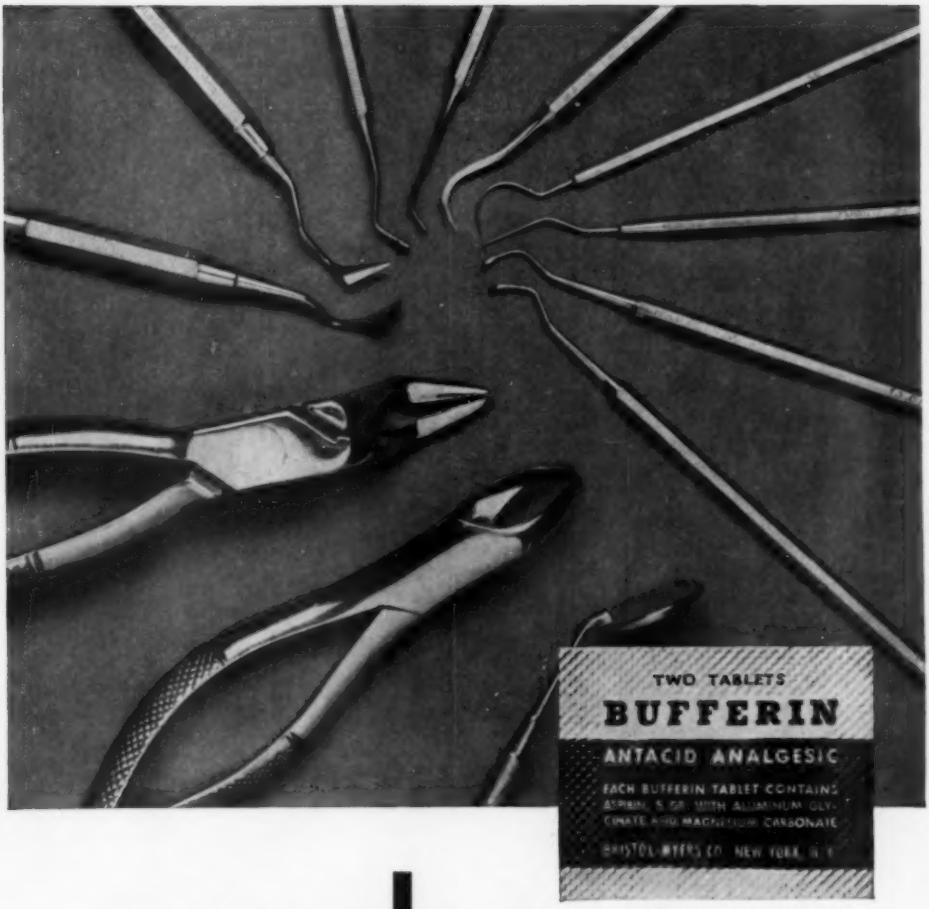

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